MOUNTING INSTRUCTIONS

Ceiling attachment Wall attachment

Applies to:

Soloflex
Triaflex
Trigenflex
Quintaflex
Mach 120
Mach 130
Mach M3
Mach M5
Mach 380
Mach 400
Mach 500
Tool and instrument trays

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These mounting instructions must be kept together with the lamp's operating instructions for reference.

General instructions

All Dr. Mach lamps are supplied with a flange with a graduated circle diameter 270mm and six bores diameter 15mm. The flange supports the vertical suspension tube. It is attached to the solid ceiling by means of a ceiling anchorage ring.
Remark: The ceiling anchorage ring has to be ordered separately!

The ceiling anchorage ring has six precisely positioned threaded bolts M12. It makes it possible to fasten and adjust the lamp without causing dust or dirt after all building work has been completed. The use of a ceiling anchorage ring is necessary in all cases of ceiling attachments.

During mounting, take care to ensure that neither the flange nor the attachment elements are in contact with reinforcement components of the solid ceiling.

In view of the slight weight of the Dr. Mach lamps, it is not fundamentally necessary to drill through the ceiling and use a counter-plate. Ceiling anchorage rings can be attached without any problems to ceilings in the concrete strength class greater than or equal to B25, using safety dowels M8.

Depending on the stability of the location, it may be necessary to use a counter-plate for the wall attachment.

The forces arising when the widely extending articulated arms tilt, do make it necessary to drill very carefully with a certified hammer drill, paying close attention to the drilling tolerances.

The suspension tube of the lamp or lamp combination must be adjusted vertically to prevent the lamp body from moving. For this purpose the M12 counter nuts on the attaching bolts must be adjusted accordingly.

In case of false ceilings, the suspension tubes for all lamps can be mounted directly through to the solid ceiling. The opening required for this purpose can be closed once the work has been completed, using the canopy diameter 450mm or a covering plate.

When using an intermediate flange (preferably for spaces exceeding 400mm and for room heights exceeding 4050mm), the length of the intermediate flange is to be measured to the lower edge of the false ceiling.
Also in this case a ceiling anchorage ring has to be used for fixation.

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Static inspection

Note:
The static (structural) inspection must be carried out before the installation of the ceiling or wall anchorage!

- The strength of the construction must be designed, checked and certified by a structural engineer.
- The respective regional construction regulations that apply must be followed.
- If a wrong hole is drilled by mistake, e.g. drilling of a reinforcement rod, the structural engineer who is responsible must be contacted, since adequate static load distribution in the ceiling may have been endangered.

Declaration of acceptance:
It is hereby certified that the supporting ceiling / wall and the ceiling anchoring / wall anchoring is safe and adequately strong.

Project: _____

_____

_____

Anchoring (please check the one that is applicable)

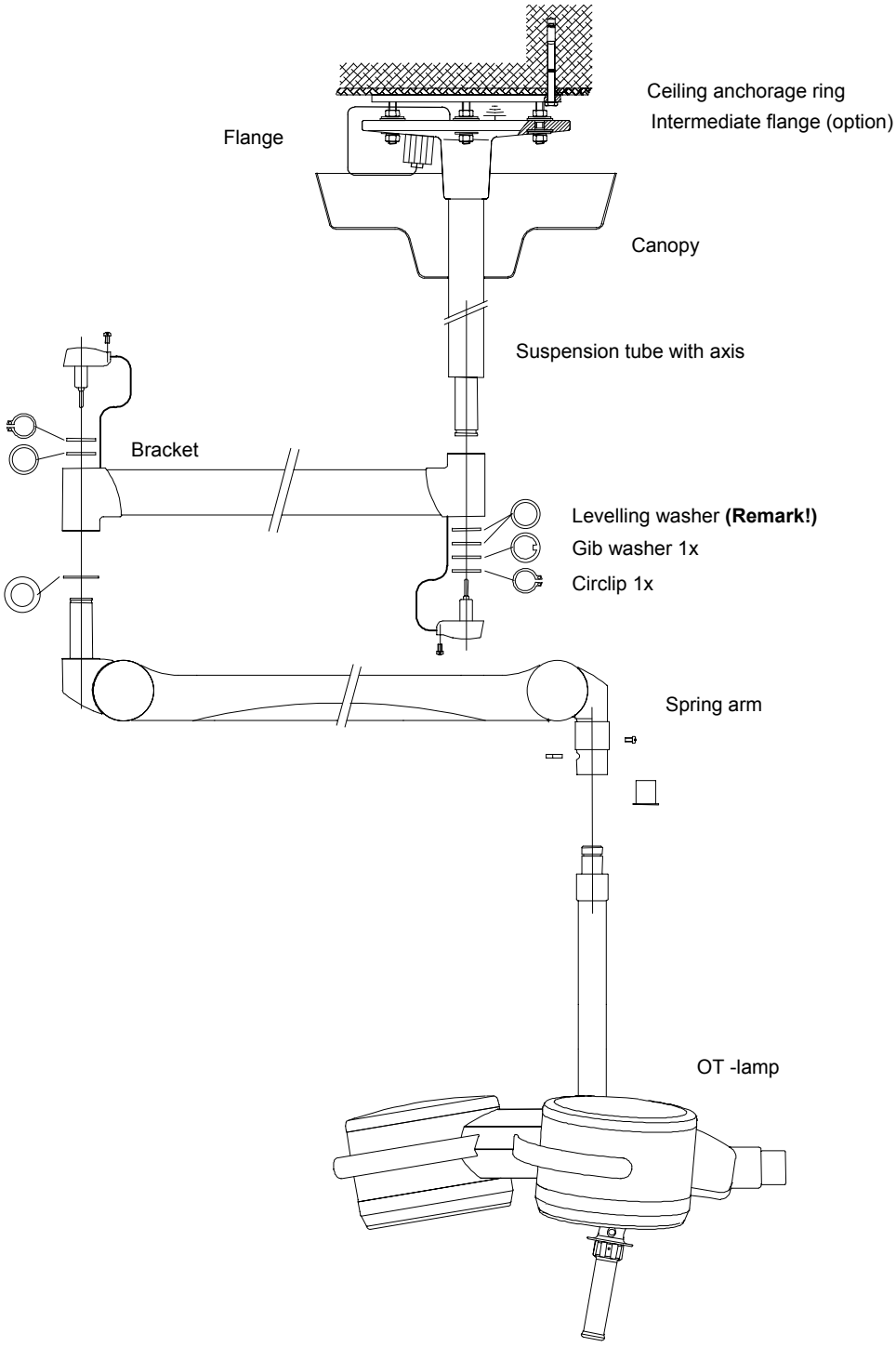
- with dowels authorized by construction authority ☐
- with counter-plate ☐
- other ☐

Location: _____

Signature / Stamp: (structural engineer / construction authority)

1. Mounting layout

Ceiling attachment



Remark:
One levelling washer is always necessary.
If the distance between bracket and spring arm is too big, use the second levelling washer.

The circlip (Seegerring) must be easy to mount and has to snap in. It should turn easily in the groove.

2. Ceiling attachment

2.1 Preparatory work on the ceiling

2.1.1 Setting the safety dowels

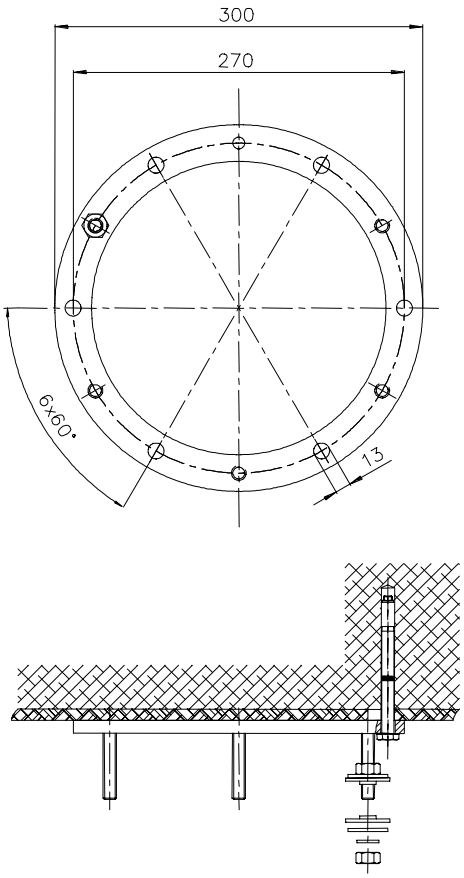
Attention:

Lamps, ceiling anchorage rings and intermediate flanges may only be attached to a ceiling of concrete strength class greater than or equal to B25. In case of light-weight ceiling coverings, the dowel anchor must be sunk completely into the concrete. To bridge this space use long threaded bolts for attaching the ceiling tube.

In addition, take care that neither suspension tube nor attaching elements come into contact with reinforcement components of the solid ceiling.

The lamp weight and the tilt of the long articulated arm(s) require that this work is performed meticulously. This refers particularly to the use of a certified hammer drill and to observe the drilling tolerances.

2.1.2 Mounting the ceiling anchorage ring to the solid ceiling



The scope of supply includes:
1 attachment set, consisting of:

- Six safety dowels Fischer FHA 12/50 galZn
- Mounting data Fischer
- Bore template

To attach the ceiling anchorage ring to a solid ceiling proceed as follows:

- Drill the bore holes according to the figure diameter 12mm and at least 100mm deep with a certified hammer drill, using the enclosed bore template. You can also use the ceiling anchorage ring as a template. In this case a second person may be needed to assist.
- Insert the safety dowels through the bores of the ceiling anchorage ring in such a way, that the washers lie flat to the ring.
- Tighten the screws carefully using a torque wrench (25Nm).

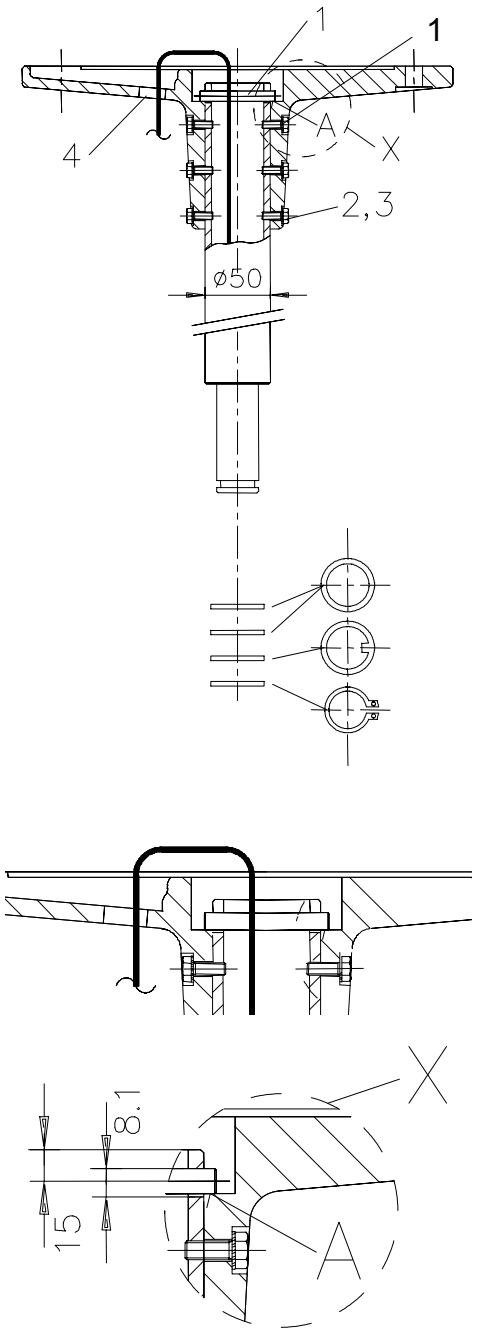
Light-weight ceiling panelling with a maximum thickness of 30mm can be bridged using the enclosed safety dowels. For panelling thicker than 30mm, it is necessary to remove the panelling before mounting.

2.2 Pre-assembly of the ceiling flange and suspension tube and installing the electrical connections

The length of the suspension tube is adjusted to the required room height with a clearance height of at least 200cm under the lamp.

2.2.1 Aluminium cast flange and suspension tube ∅ 50mm

For the double models, slide the canopy (if not divided) and the ring over the corresponding suspension tube before mounting the ceiling bearing. This step is not necessary for the single models as the canopy can be slid into place after mounting the suspension to the ceiling.



Standard version

The diagram shows the single model and applies in the same way to the double and triple models.

- Cable or cord showing out the suspension tube is to be pushed carefully into the ceiling flange together with the suspension tube.
- Push the suspension tube upwards until the safety pin **1** can be pushed through the cross bores of the suspension tube.
- Then pull the suspension tube down until the safety pin **1** lies in recess **A** of the ceiling flange.
- Then secure the connection with six screws **2** and washers **3** to prevent wobbling. If not possible, turn suspension tube by 180°.
- Pull the cable or cord through the bore **4** as shown in the diagram.

Note:

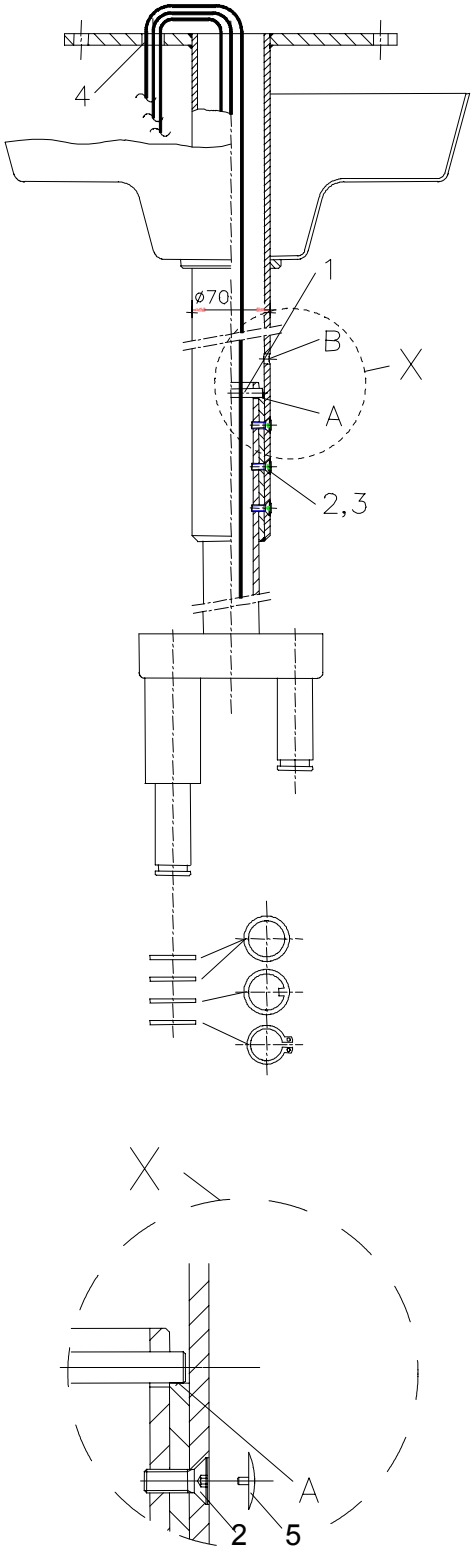
The suspension tube is delivered with pre-mounted retaining ring for the ceiling canopy.

Each connection journal is also equipped with:

- **2 spacer rings**
- **1 gib ring**
- **1 circlip (Seegerring)**

2.2.2 Flange tube ∅ 70mm

When necessary (in case of very high rooms or heavy lightning systems) a welded construction is used in which the ceiling flange is welded to a tube. Also for double and triple types, slide the canopy (if not divided) and the ring over the flange tube before mounting the suspension tube.



Standard version

The diagram shows the triple model and applies in the same way to the single and double models.

- Cable or cord showing out the suspension tube is to be pushed carefully into the ceiling flange together with the suspension tube.
- Push the suspension tube down until the safety bolt **1** can be pushed through bore **B** of the flange pipe into the cross bores of the suspension tube.
- Then pull the suspension tube down until the safety bolt lies in recess **A** of the ceiling flange.
- Then secure the connection with six countersunk screws M6x16 **2** (tool: hexagonal socket wrench) to prevent wobbling. If not possible, turn suspension tube by 180°.
- Pull the cable or cord through the bore **4** as shown in the diagram.
- Fix the covers **5** on screws **2**.
- Put the two covers on the bores **B**.

The table on page 9 shows the recommended distance between floor and suspension tube.
Please check this distance when mounting the lamp.

Note:

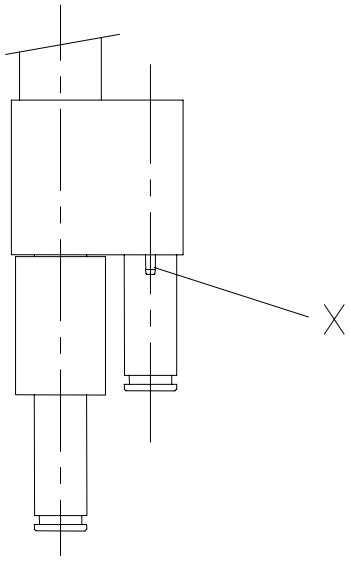
The suspension tube is delivered with premounted retaining ring for the ceiling canopy.

Each connection journal is also equipped with:

- **2 spacer rings**
- **1 gib ring**
- **1 circlip (Seegerring)**

2.2.3 Light weighted central axis (connection which can turn through 360°)

The pre-assembly instructions given on chapter 3.2 also apply here.



Double model (can turn through 360°)

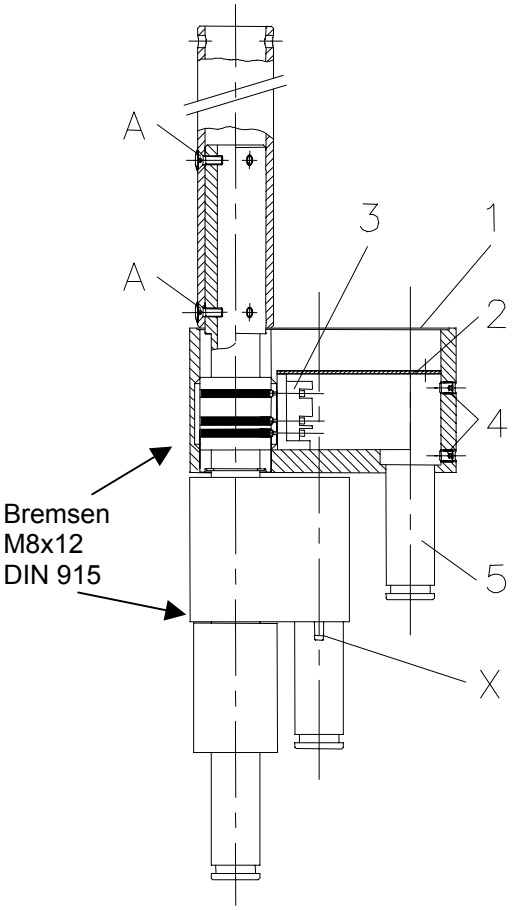
The suspension tubes which can turn through 360° are supplied ready mounted and wired. The length is usually already adjusted according to the room height.

Before mounting, check that the six threaded pins **A** of the pre-assembled connections are properly fixed.

X plugger pin for articulated arm
(see remark at the mounting instructions for articulated arms on page 18).

Triple model (can turn through 360°)

See above.



Instructions for replacing the sliding contact set (only when required)

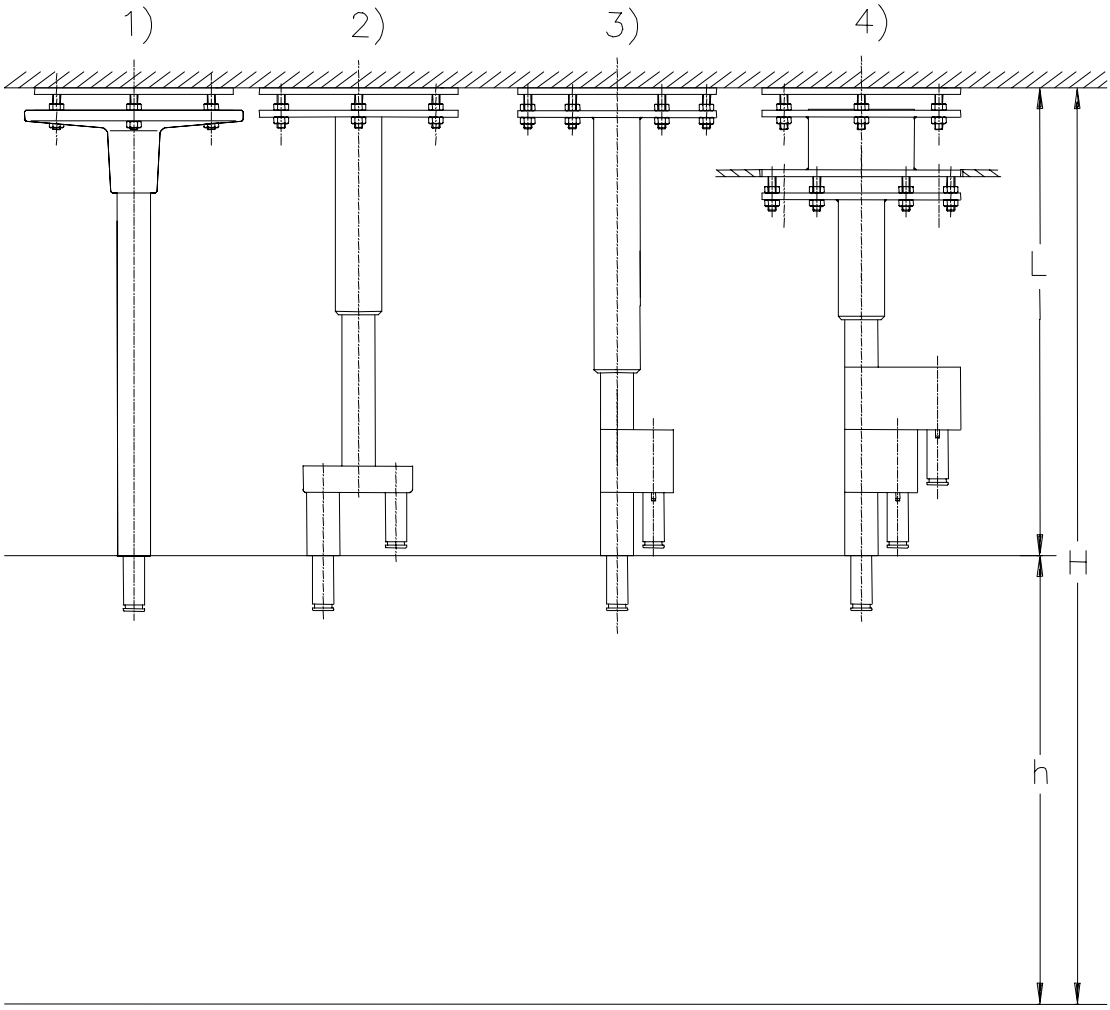
- **Loosen cover 1 and swivel away to the side.**
- **Loosen the four threaded pins M8 4, so that the coupling journal 5 is loose.**
- **Take off safety plate 2.**
- **Loosen sliding contact set 3.**
- **Remove together coupling journal 5 and sliding contact set.**
- **Replace sliding contact set.**
- **Remount in reverse order.**

Note:

This procedure is basically the same for the triple and double bracket, apart from more constricted space in the double bracket.

2.2.4 Ceiling attachments and room heights

Ceiling attachments



Featured examples (selection)

1 Single suspension tube with aluminium cast flange and ceiling anchorage ring
2 Double standard axis with welded flange tube and ceiling anchorage ring
3 Double light weighted central axis, can be turned through 360°, with welded flange tube and ceiling anchorage ring
4 Triple light weighted central axis with welded flange tube, intermediate flange and ceiling anchorage ring

H = room height
Clearance upper edge floor – lower edge solid ceiling

h = prescribed distance upper edge floor to lower edge suspension tube as specified for the particular lamp

L = length of suspension tube respectively entire suspension device (ceiling anchorage ring + intermediate flange + suspension tube)

Room heights H single lamps

Lamps	Hmin* depending on ceiling attachment	Hmin** depending on lamp head
Mach 120	2450	2575
Mach 120F	2450	2575
Soloflex	2450	2570
Soloflex with handle sleeve	2450	2630
Mach 130	2450	2625
Mach 130 -ster. handle sleeve	2450	2625
Triaflex	2450	2580
Triaflex with cardan bow	2450	2630
Trigenflex	2450	2760
Quintaflex	2450	2825
Mach M3	2450	2862
Mach 380	2450	2862
Mach 400	2450	2897
Mach 500	2450	2867
Tool and instrument trays	2450	2680

* Min. room height in the case of ceiling attachment with shortest suspension tube (180mm)
** Min. room height in case of clearance height of 2000mm under the handle of the lamp

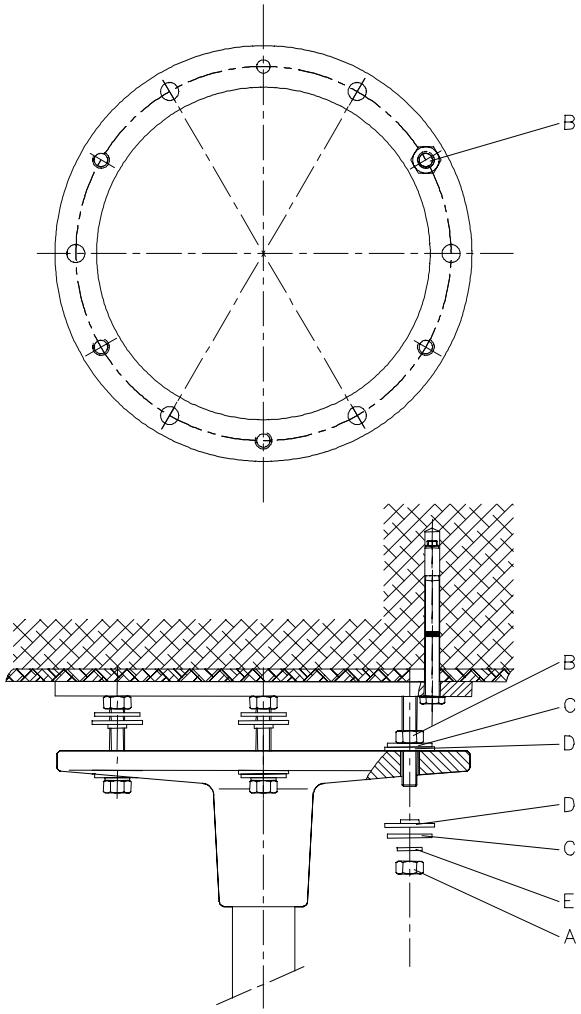
Room heights H single lamps – low room height

Lamps	Hmin* depending on ceiling attachment
Soloflex with turned joint	2450
Triaflex with turned joint	2450
Trigenflex with fully cardanic joint	2450
Trigenflex with central spring arm	2450
Quintaflex with central spring arm	2450
Mach M3 with central spring arm	2450
Mach 380 with central spring arm	2450
Mach 400 with Space-arm	2520
Mach 500 with Space-arm	2520

* Min. room height in the case of ceiling attachment with shortest suspension tube (180mm)

2.3 Mounting the flange and the suspension tube to the ceiling

Before mounting the flange and the suspension tube, assembly work on the ceiling (setting the dowels or mounting the ceiling anchorage ring and possibly mounting the intermediate flange) must be completed and all pre-assembly work finished.



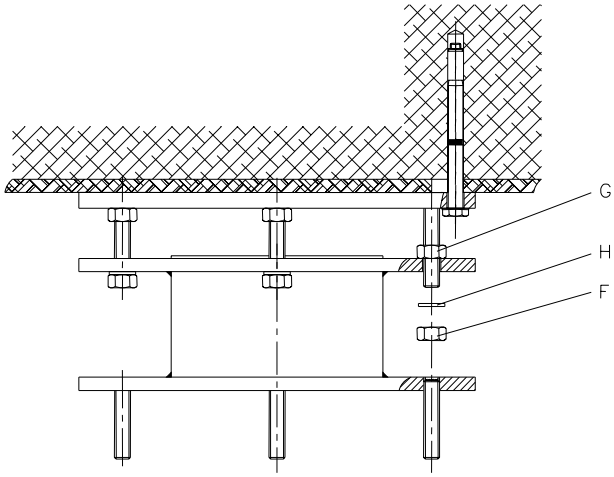
Type with ceiling anchorage ring

- Screw three nuts **B** (each 120°) to the plate of the ceiling anchorage ring, holding the other three nuts 0,5cm away from the plate, unscrew nuts **A**.
- Position six washers **C** and six insulating washers **D** on the flange.
- Position the flange with suspension tube on the threaded bolts and adjust it to the required height using three nuts **A** and washers **C**, insulating washers **D**, and retaining washers **E** (each 120°).
  Note: Washers C, insulating washers D and retaining washers E must be put on the flange in the same order as shown in the figure.
- The three-point mounting allows a simple vertical adjustment of the suspension tube.

Vertical adjustment is very important and must be carried out with great care.

If the flange with suspension tube is not in the correct vertical setting, the support arms of the lamp do not remain precisely in the proper position, they could turn away and would therefore require excessive braking.

- Then position from above all six nuts **B** gently against the flange.
- Screw on the remaining three nuts **A** with washers **C**, insulating washers **D** and retaining washers **E** and tighten all six nuts equally cross-wise with a torque wrench (25 Nm).
  Note: Washers C, insulating washers D and retaining washers E must be put on the flange in the same order as shown in the figure.
- Verify balance with a spirit-level.



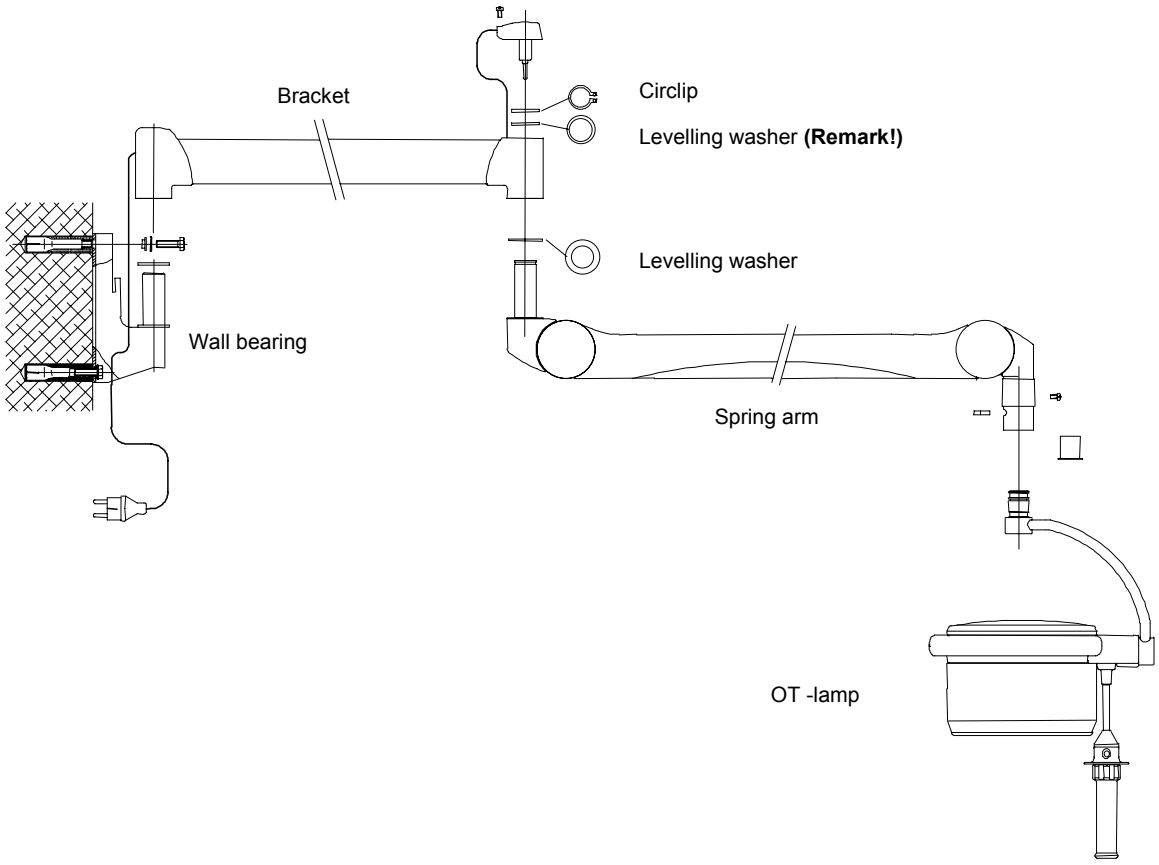
Type with ceiling anchorage ring and intermediate flange

- Screw three nuts **G** (each 120°) to the plate of the ceiling anchorage ring, the other three 1cm away from the plate, unscrew nuts **F**.
- Position the intermediate flange on the threaded bolts and adjust it to the required height using three nuts **F** and washers **H**.
- Then position all six nuts **G** gently against the intermediate flange from above.
- Screw on the remaining three nuts **F** with washers **H** and tighten all six nuts equally cross-wise with a torque wrench (25 Nm).
- Verify balance with a spirit-level.

For mounting the flange to the intermediate flange proceed as described at the design with ceiling anchorage ring.

3. Mounting layout

Wall attachment

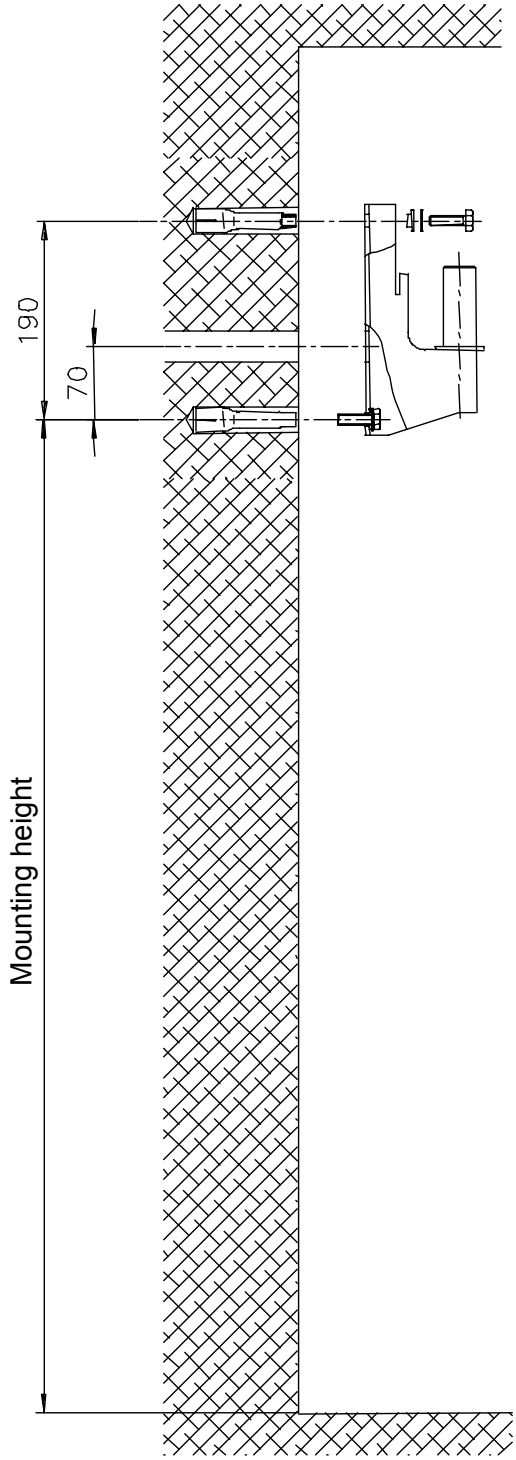


Remark:
One levelling washer is always necessary.
If the distance between wall bracket and spring arm is too big, use the second levelling washer.

The circlip (Seegerring) must be easy to mount and has to snap in. It should turn easily in the groove.

4. Wall attachment

4.1 Preparatory work on the wall



Fastening with tubular dowel

- Using the enclosed template, mark the bore-holes at the proper height (depending on the lamp type) precisely perpendicular.
- Drill or chisel out a hole ∅ 25mm (or slightly larger) 100mm deep.
- Cement or grout in the tubular dowel flush with the wall or slightly deeper and let it set well (keep strictly to the 190mm spacing and per-pendicular position).

Fastening with counter-plate

Depending on the stability of the location, it may be necessary to use a counter-plate for the wall at-tachment.

- Ascertain the exact position of the OT-lamp-
- In the case of a fixed connection, lay the elec-trical cable.
- Stick the supplied drilling template to the wall.
- Drill the two holes ∅ 12mm and 190mm apart. When drilling, keep as closely as possible to the spacing between the holes. The counter-plate can be mounted with variations of up to 20mm.

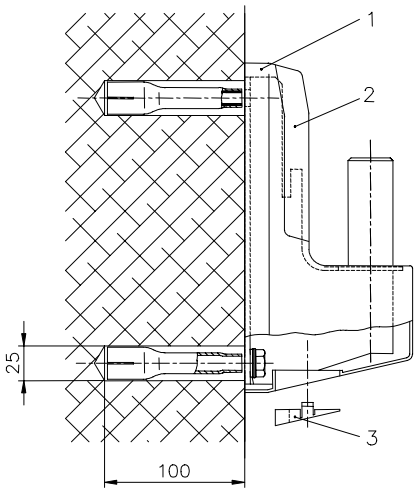
Electrical connection is carried out later using a 2m long cable provided by Dr. Mach with shock-proof plug on the wall arm.

It is important to check whether there is an appro-priate plug socket in the vicinity.

If the lamp is to be connected directly, the mains connection must be located between the two fixing screws (see section showing electrical connection).

Follow any directions given by the technical staff!

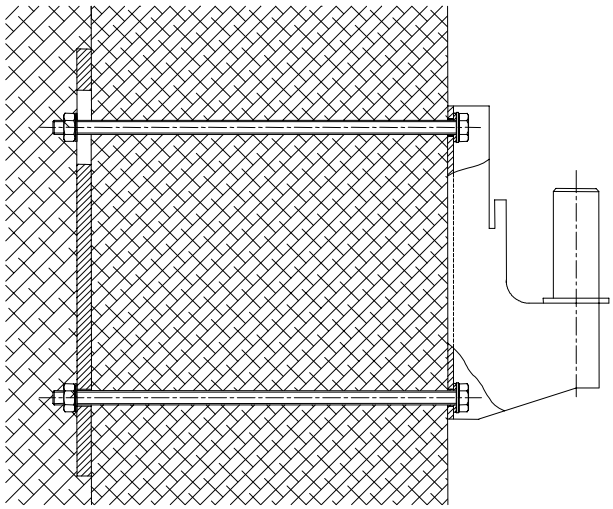
4.2 Mounting the wall bearing



For mounting the wall bearing proceed as follows:

Fastening with tubular dowel

- Screw tight the wall bearing with two M10x35 screws (having first pushed the washer of ∅ 10mm and the plastic cover washer on the screw).
- Place cover **1**, cover **2** and cap **3** in position in such a way that they engage in the locks.

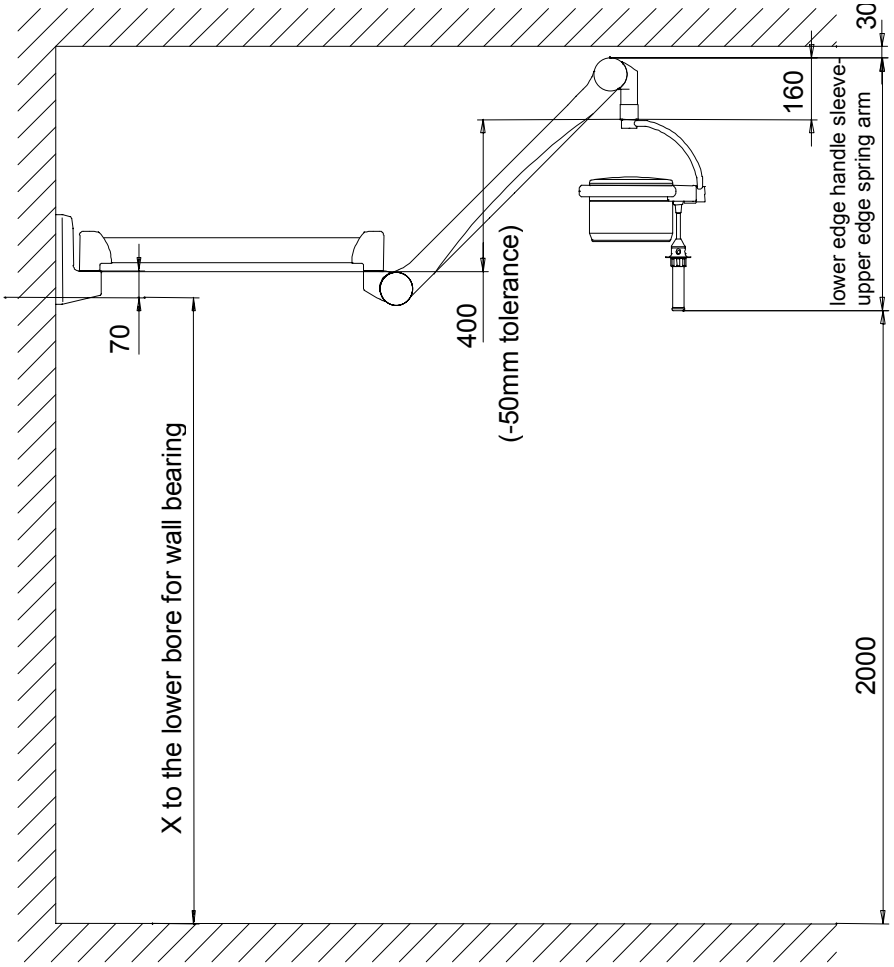


Fastening with counter-plate

- Fix the wall bearing, push through the M10 threaded rods and screw on the wall bracket and counter-plate using bolts and hexagonal nuts (if necessary, weld the hexagonal nuts to the counter-plate).
- Place cover 1, cover 2 and cap 3 in position in such a way that they engage in the locks.

4.2.1 Wall attachment, room heights

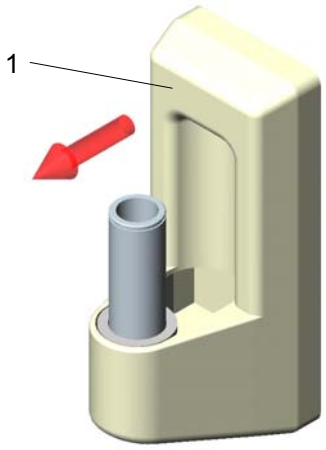
Wall attachment



Room heights H wall attachments

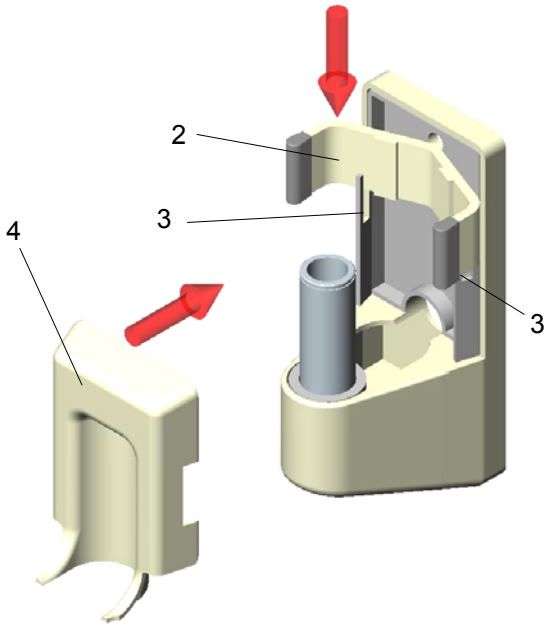
Lamps	Lower bore for wall bearing (min.)	Hmin, so the spring arm can be adjusted	Hmin for passing height of at least 2000mm
Mach 120	2005	2575	2450
Mach 120F	2005	2575	2450
Soloflex	2000	2570	2450
Soloflex with handle sleeve	2060	2630	2470
Mach 130	2055	2625	2465
Mach 130 –ster. handle sleeve	2055	2625	2465
Triaflex	2010	2580	2450
Triaflex with cardan bow	2060	2630	2470
Trigenflex	2190	2760	2600
Quintaflex	2255	2825	2665
Mach M3	2292	2862	2702
Mach 380	2292	2862	2702
Tool and instrument trays	2110	2680	2480

4.3 Installing the extension arm stop (surcharge)

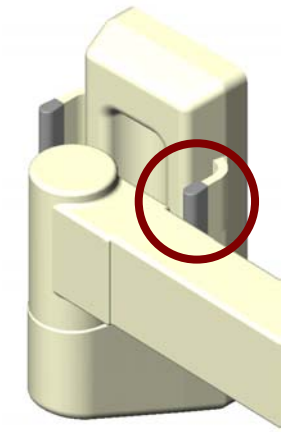


Note:
The stop is supplied with a plastic cover with cut-out.
The upper plastic cover of the wall bearing is no longer required and may be discarded

- Remove and discard the upper plastic cover **1** of the wall bearing.



- Insert the **extension arm stop 2** into the two **grooves 3** of the wall bearing as shown in the figure.
- Check the **extension arm stop 2** for firm seating.
- Install and engage the supplied **plastic cover with cut-out 4**.
- Check the **plastic cover with cut-out 4** for firm seating.



- The mounted **extension arm stop** protects the lamp from damages caused by accidental touching of the wall.

5. Electrical connection

5.1 Preparing the electrical connection

Ceiling mounting

Extent of supply
- **Cable with special plug**
- **Line clamps on the flange**

Please take note:
- **Mark the cables with special plugs on both sides with numbers (only combinations): 1=main light, 2=satellite lamp 1, 3=satellite lamp 2).**
- **Mark also the receptacles on the axis (the lowest position with 1, the other positions increasing with 2 and, if present, with 3).**

Put the cables with special plug through the flange tube. Ensure that the cables are cut to a length which allows approx. 15cm cable to extend from the suspension tube.

The flange is fitted with line clamps for connecting the light system to the electrical circuit. These clamps should be accessible for electrical safety checks during installation and also later.

Connect the mains supply and the cables with special plugs to the line clamp in the right order (plug no.1 to receptacle no.1, etc.).

Wall attachment

The lamp is normally supplied with integrated transformer and connection cable with shock-proof plug (except Mach 120 and Mach 380). The socket used must be installed according to IEC or VDE 0107 requirements.

The cross-sections of the leads depend on the lead-length and power consumption. Please refer to the following table:

Power consumption [W]	Lead length [m]			
	up to 10	up to 20	up to 40	up to 70
50	2,5	2,5	2,5	4,0
150	2,5	2,5	4,0	6,0
200	2,5	4,0	6,0	10,0
250	2,5	4,0	6,0	10,0
	Cross-section of lead [mm^2]			

Once the electrical connections have been completed, check that the system functions correctly in a no-load operation trial run.
When connecting to an external transformer, the emerging voltage U will be approx. 10-20% above rated voltage because of no load and anticipated lead losses. There is no point in making any adjustments until the lamps have been completely mounted.

5.2 Electrical connection for lamps with external transformer

Position of transformer – Dr. Mach lamps

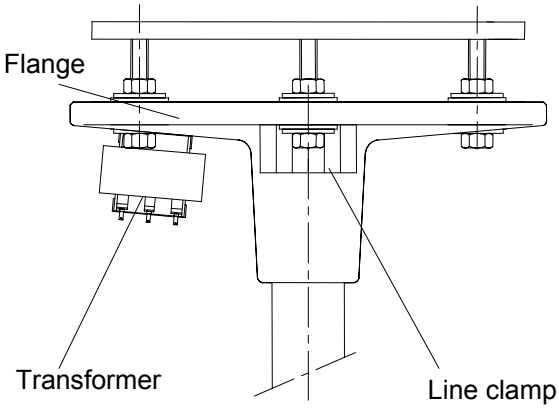
Lamps	External transformer	Transformer in the lamp housing	Remark
Makrolux		X*	
Miniflex		X*	Transformer mounted in bracket
Mach 120	X*		
Praxila	X	X*	
Soloflex	X	X*	
Mach 130 / Uniflex	X	X*	For models with electronic transformer- potentiometer instead of change-over-switch
Triaflex	X	X*	
Trigenflex	X	X*	
Quintaflex	X*		
Mach M3	X*		
Mach 380	X*		
Mach 400	X*		
Mach 500	X*		
Mach 700	X*		

* Transformer included in extent of supply
Note: In case of lamps with external transformer, the transformer must be mounted separately.

5.2.1 Ceiling lamps with external transformer

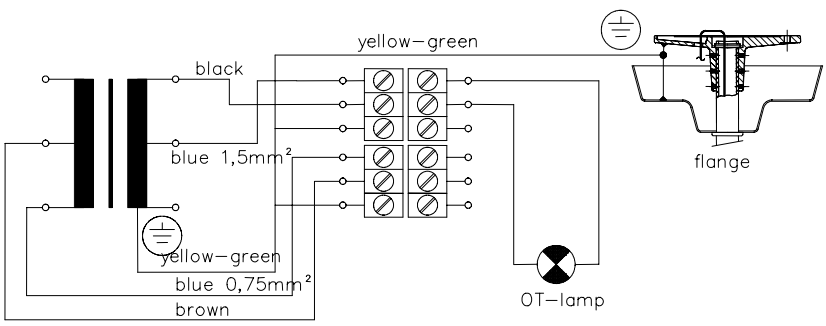
a. Single-phase transformer mounted on the flange

View



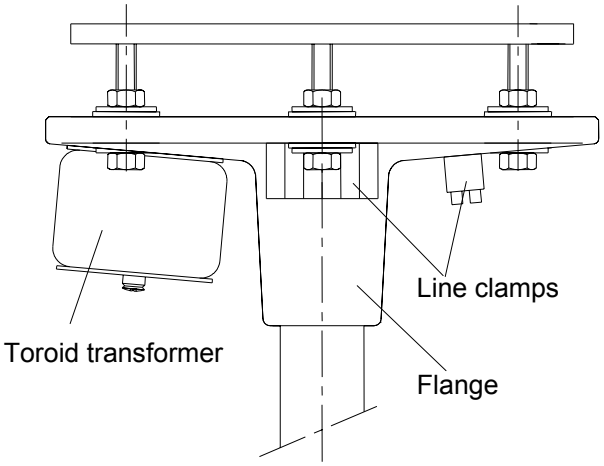
The single-phase transformer is already mounted on the flange.
At delivery it is already connected to the line clamp. You have to connect the power supply and the lamp to the line clamp (see wiring).

Wiring



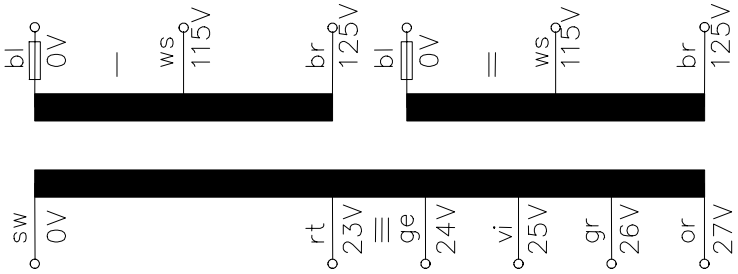
b. Toroid transformer mounted on the flange

View



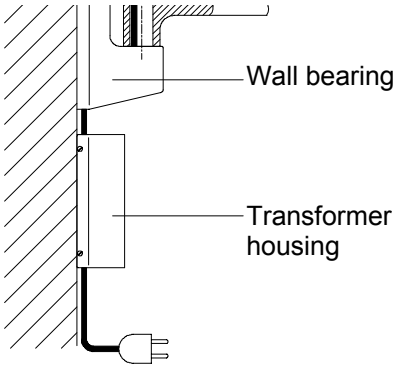
The toroid transformer is already mounted on the flange.
At delivery it is already connected to the line clamps. You have to connect the power supply and the lamp to the line clamp (see wiring).

Wiring



5.2.2 Wall lamps with external transformer

a. Lamps Mach 120, Praxila



The transformer is mounted in a transformer housing positioned on the wall.

b. Lamp Mach M3, Mach 380

If possible, You should mount the transformer in a separate room.
If not possible, try to find an appropriate mounting place for the transformer. In case of a false ceiling you can mount the transformer between false ceiling and solid ceiling.

5.2.3 Lamps with regulating transformer

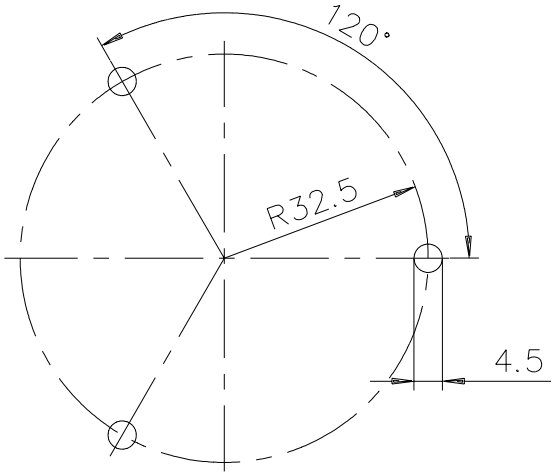
The regulating transformer is used for light intensity control at the lamps. It is positioned inside the switch cabinet / switch board (OT-panel).

Technical data

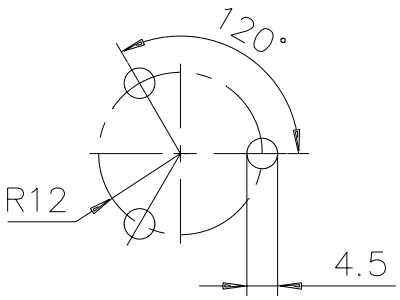
	Type RN 230 / 1.25 Bgr. P40	Type RN 230 / 1.6 Bgr. P65
Primary voltage	230V	230V
Secondary voltage	184 – 230V	0 – 230V
Frequency	50 – 400Hz	50 – 400Hz
Current	1,25A	1,6A
Power	287,5VA	368VA
System of protection	IP00	IP00

For mounting the regulating transformer see drilling jigs below:

Type RN 230/1.25 Bgr. P40

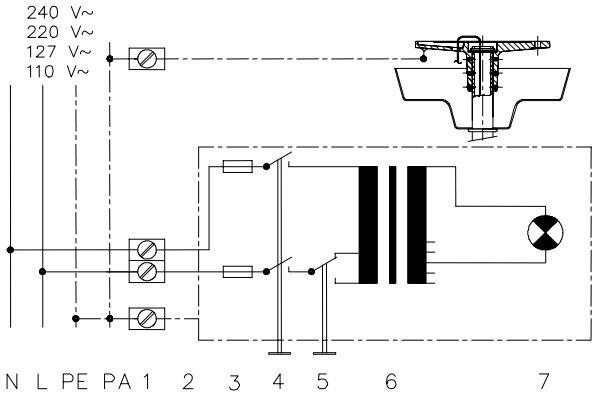


Type RN 230/1.6 Bgr. P65



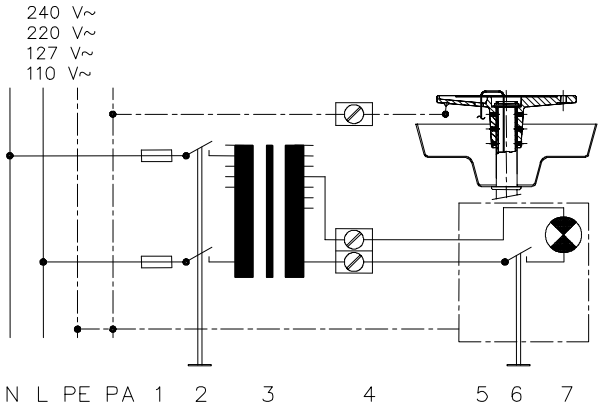
The regulating transformer is connected between mains and lamp transformer.

5.3 Wiring diagrams



Transformer in the lamp housing

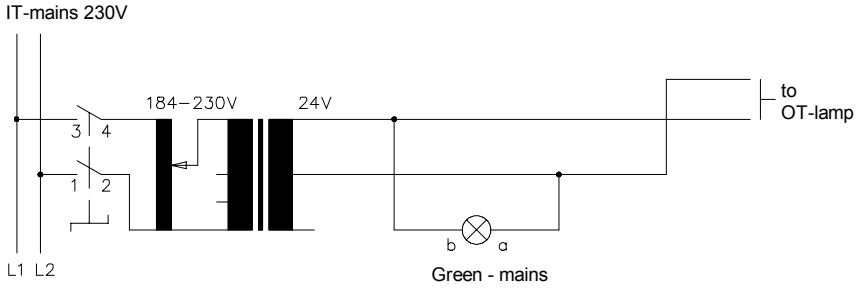
1. Clamps on the flange
2. Coupling with sliding contact on flange
3. Fuses
4. ON/OFF switches
5. Converter
6. Transformer IT
7. Light bulb(s)



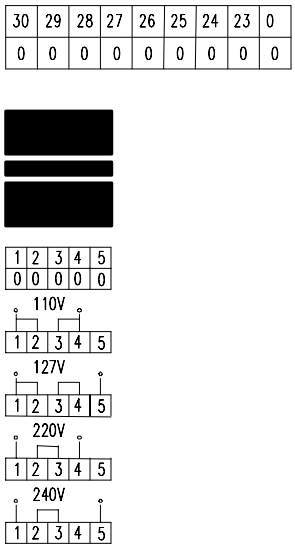
External transformer

1. Fuses
2. ON/OFF switch (4-pole for emergency power connection)
3. Transformer IT
4. Clamps on the flange
5. Coupling with sliding contact on flange
6. Secondary ON/OFF switch (not for Quintaflex)
7. Light bulb(s)

Regulating transformer

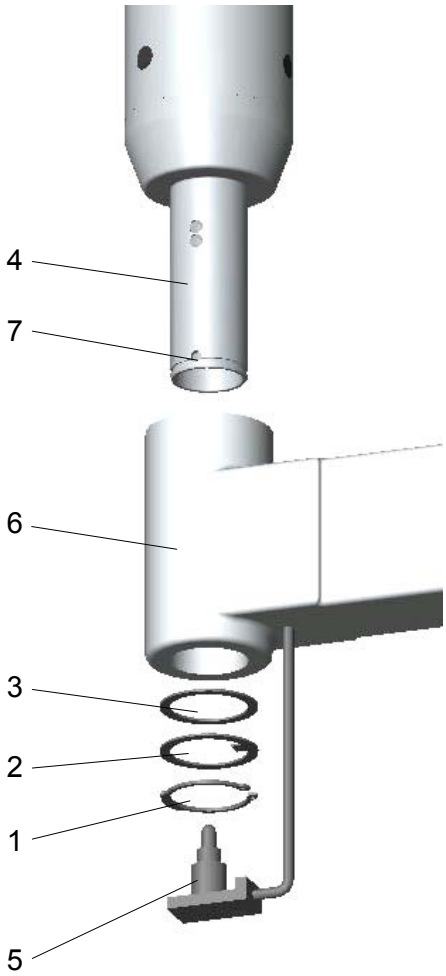


Connecting diagram



6. Mounting the articulated arms

6.1 Ceiling mounting



6.1.1. Mounting the extension arm

Attention!
Disconnect the on-site power supply and protect it from being switched on again.

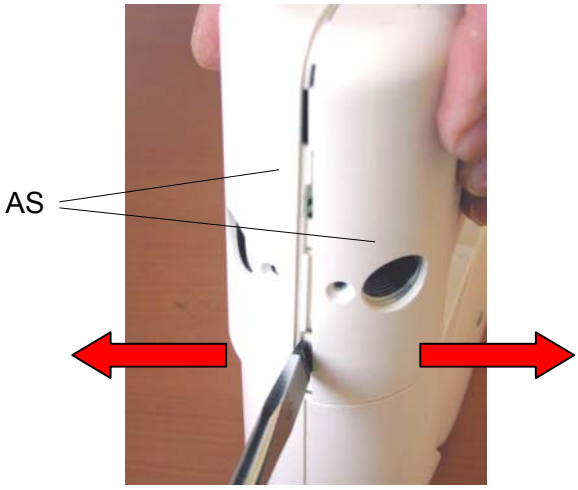
- Remove the fastening devices (retaining ring **1**, tab washer **2** and disk ∅ 38mm **3**) from the suspension tube (tool: mounting plier).
- Remove the lateral covering plates of the bracket as described in chapter 6.1.2.
- Carefully remove the plug **5** from the extension arm **6** and slide the extension arm onto the single part extension arm bearing **4**.

Attention!
Danger of injury: If the tab washer is missing, the retaining ring will loosen and the device may fall out of the mounting and cause serious injury.
<u>Always</u> install the tab washer.

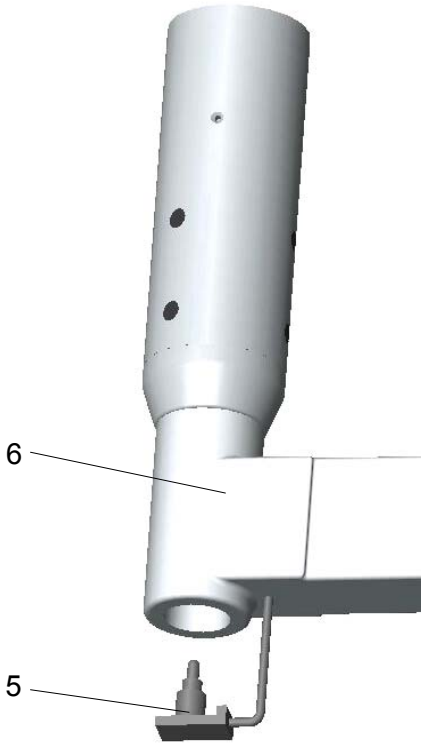
- Install the disk ∅ 38mm **3**, then insert the tab washer **2** into the hole **7** and install the circlip **1**.
- Check the extension arm for firm seating.

6.1.2 Removing the lateral covering plates

- Loosen the two screws **S** with a cross-head screw driver.
- Remove the white covering caps **AK** at the bracket.
- Remove the subjacent brake screws **B** with a big screw driver.

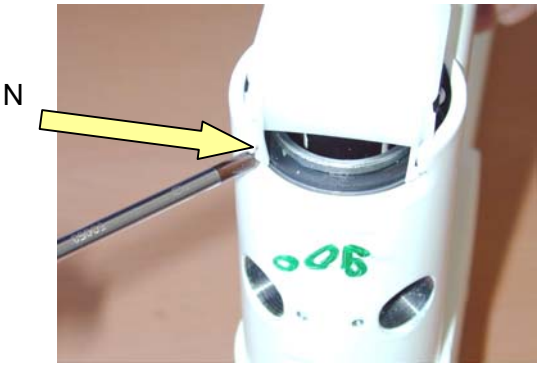


- Spread the two covering plates **AS** by using a screw driver.



6.1.3 Electrical connection

Attention!
If the cables at the plug are damaged, the extension arm is under a voltage of 230V.
Install the plug carefully.

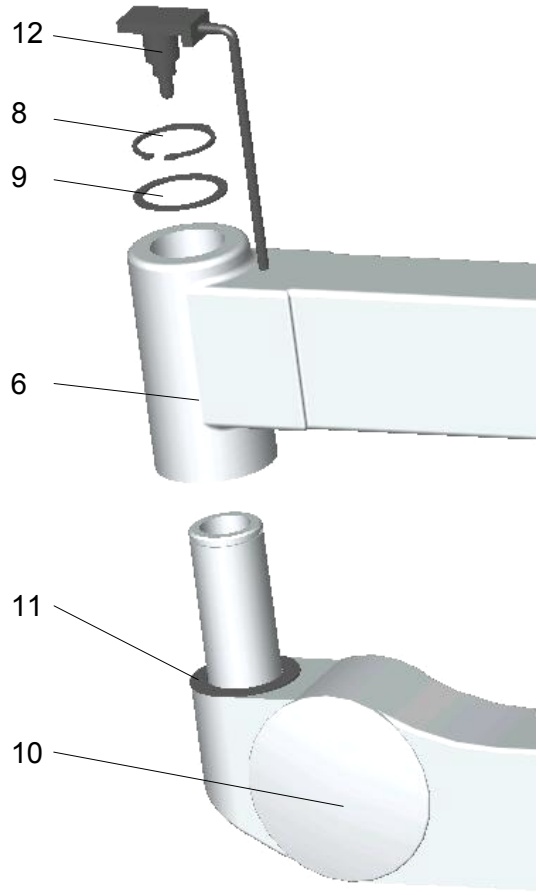


- Position the plug **5** straight and push it toward the extension arm **6** using slight pressure.
- Push the two noses **N** of the plug to the inside with a screw driver, until they snap in.
- Check the plug for firm seating.
- Position and engage the casing halves.
- Screw in the two brakes **B** and the two screws **S** (see chapter 6.1.2).
- Put the two covering caps **AK** on the brake screws.
- Check the casing halves for safe fit.

6.2 Wall mounting

Place the upper articulated arm onto the mounted wall bearing on the side of the electrical connection.
In case of a lamp with built in transformer put the plug into the socket.
If the electrical connection is made through the wall (no plug), the power supply cable is connected to the line clamp in the wall bracket (below cover **1**).
Caution: When making the electrical connection, please make sure, that the current is not passing through the line!

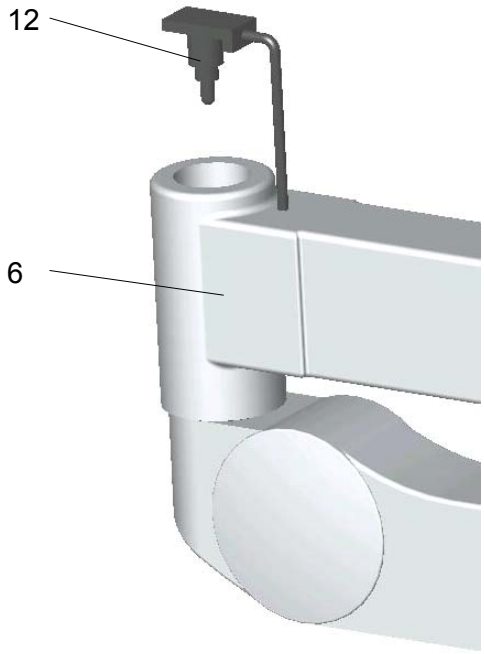
6.3 Mounting the spring arms



6.3.1 Mounting the standard spring arm

Attention!
Disconnect the on-site power supply and protect it from being switched on again.

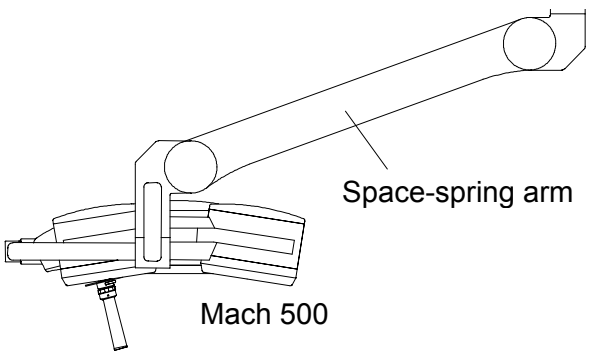
- Remove the two lateral covering plates of the bracket as described in chapter 6.1.2.
- Carefully pull the plug **12** off the bracket.
- Remove the circlip **8**, then remove the disk ∅ 38mm **9** and the protective sleeve from the spring arm **10**.
- Make sure that the disk ∅ 48mm **11** is installed to the spring arm.
- Carefully remove the plug **12** from the extension arm **6**.
- Slide the spring arm **10** into the extension arm **6**.
- Install the disk ∅ 38mm **9** and install the retaining ring **8**.
- Check the spring arm **10** for firm fixation in the extension arm **6**.
- Establish the electrical connection as described in chapter 6.3.2 and mount the casing halves.



Electrical connection

Attention!
If the cables at the plug are damaged, the extension arm is under a voltage of 230V.
Install the plug carefully.

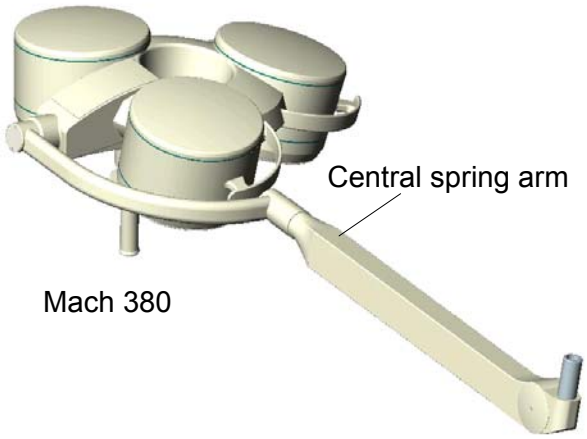
- Position the plug **12** straight and push it toward the extension arm **6** using slight pressure.
- Check the plug for firm seating.



6.3.2 Mounting the Space spring arm (Mach 400 Mach 500, Mach 700 single lamps at low room heihgts)

The Space –spring arm is intended for installing lamps as Mach 700 and Mach 500 / Mach 400 in cases of low room height. The lamp is suspended on the side of the spring arm.
You still have the necessary free clearance height for Mach 400 and Mach 500, despite the low room height. Still, the lights can be moved in the X-axis and Y-axis.

For mounting the Space –spring arm to the ceiling attachment proceed as described at chapter 6.3.1.

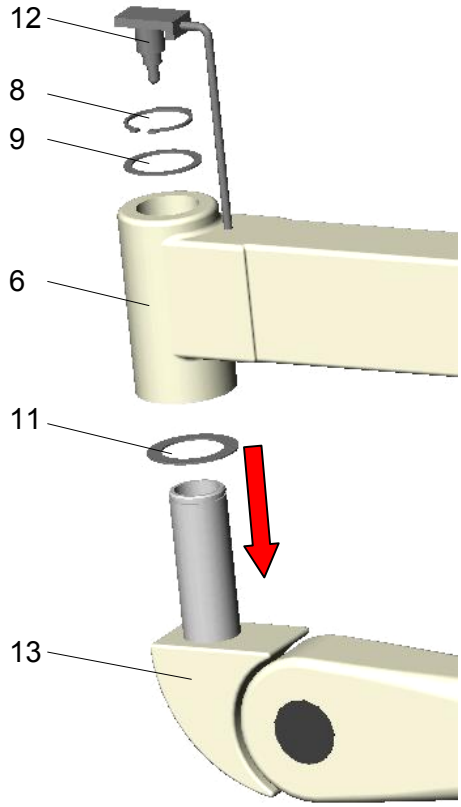


6.3.3 Mounting the central spring arm (Mach 380, Mach M3, Quintaflex, Trigenflex ceiling lamps at low room height)

Central spring arm (since 2000)

The central spring arm is intended for installing lamps as Mach 380, Quintaflex and Trigenflex in cases of low room height.
You still have the necessary free clearance height, despite the low room height. Still, the lights do not have a fully cardanic suspension anymore.

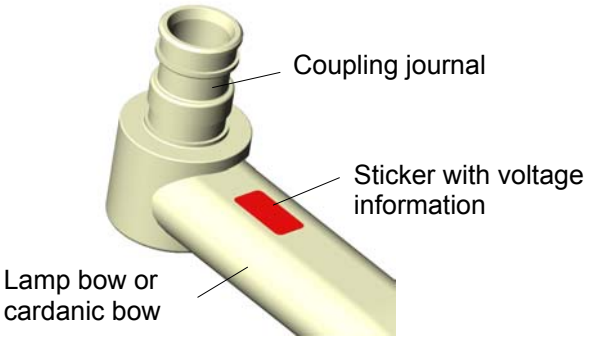
For mounting the central spring arm to the ceiling attachment proceed as described at chapter 6.3.1.



Central spring arm (until 2000)

- Disconnect the on-site power-supply.
- Remove the two lateral covering plates of the bracket as described in chapter 6.1.2.
- Carefully pull the plug **12** off the bracket.
- Remove the circlip **8**, then remove the disk ∅ 38mm **9** and the protective sleeve from the spring arm **10**.
- Install the disk ∅ 48mm **11** on the spring arm **13**.
- Carefully remove the plug **12** from the extension arm **6**.
- Slide the spring arm **13** into the extension arm **6**.
- Install the disk ∅ 38mm **9** and install the retaining ring **8**.
- Check the spring arm **13** for firm fixation in the extension arm **6**.
- Establish the electrical connection and mount the casing halves.

7. Mounting the lamps



Attention!
Each lamp has a red sticker applied near the coupling journal at the lamp bow or cardanic bow. The sticker shows the rated voltage of the lamp.
Connect the lamp only to the prescribed voltage, to avoid irreparable damage (e.g. the electronical components).

Following rated voltage is usual:

22,8 V *230 V* *120 V* *110 V*

After mounting the lamp take off the sticker and dispose it, otherwise it could fall down in the OT-field after some time!

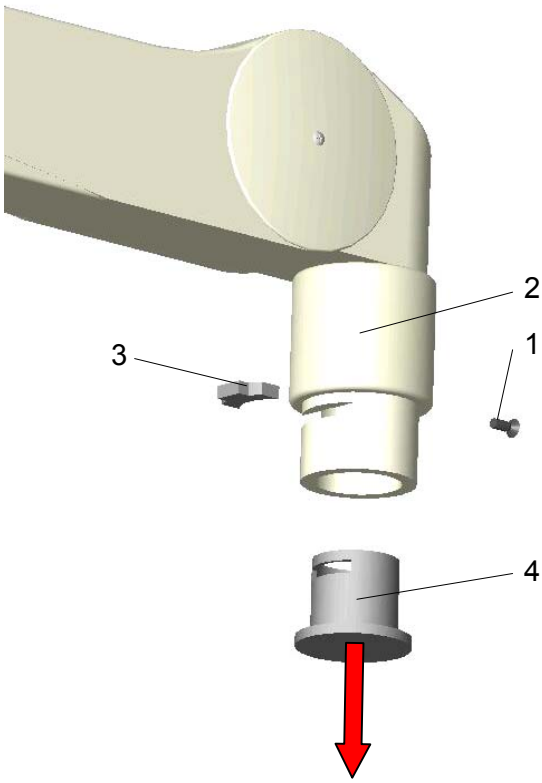
When mounting the lamp and also at one-yearly intervals, a light coat of acid-free grease should be applied to the mounting journal and the journal groove F of the lamp, or possibly the already existing cardan bow.

Caution:

The lamp may only be dismounted (in reverse order to the mounting procedure) after the mounting safeguard has been positioned and screwed tight, as the arm is under spring tension.

Never let the spring arm bounce up!

7.1 Mounting at the standard spring arm



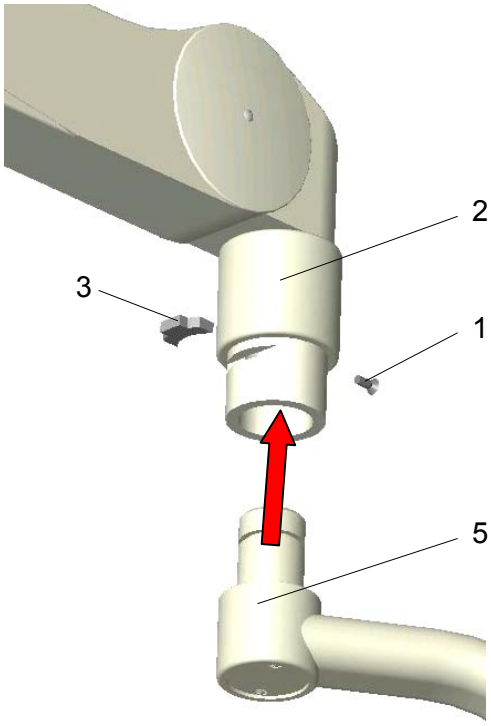
7.1.1 Preparatory work

Attention!
Disconnect the on-site power supply and protect it from being switched on again.

- Disconnect the equipment / pull out the power plug and protect the equipment from being switched on again.

Attention!
Danger of injury: When it is pressed down, the spring arm can jump up suddenly and cause injury.
During the installation of the lamp / device, do not allow anyone to be within the swivelling range of the spring arm.

- Remove the recessed head screw **1** and slide the sleeve **2** up.
- Remove the securing segment **3** with a small-bladed screw driver.
- Remove the protective cap **4** from the mounting.



7.1.2 Mounting

Attention!
Danger of injury: If an incorrect segment is used, the lamp / device may fall out of the mounting and cause serious injury.
Use only original securing segments.

Note:
Maximum lamp / device weight: The lamps / devices must not exceed the weight of the mounted spring system. For details about the spring system please refer to the type plate of your ACROBAT 2000.

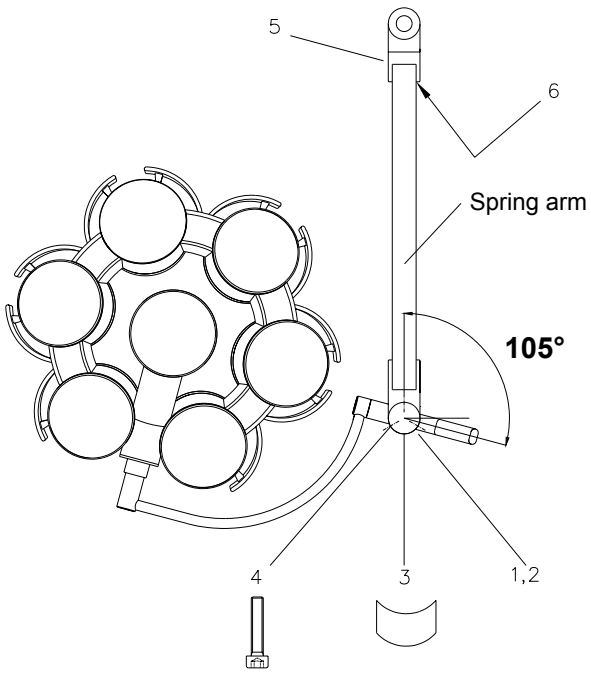
Spring versions:

- 1,0 – 3,5 kg;
- 3,5 – 7,0 kg;
- 7,0 – 12,0 kg;
- 12,0 – 18,0 kg;
- 18,0 – 21,0 kg

- Insert the bow **5** (with grease) into the mounting of the spring arm, insert the securing segment **3** and slide the sleeve **2** down.
- Install the recessed head screw **1**.
- Check the bow **5** with the lamp / device for firm seating in the spring arm.
- Adjust the spring force as described in chapter 8.2.1.
- Adjust the vertical limit as described in chapter 8.3.1.

7.2 Mounting at the space spring arm

Top view



Attention: It is <u>not possible</u> to turn the lamp around this joint (in horizontal plane) because of its fixing with the three screws.

To mount a lamp to the space spring arm proceed as follows:

- Loosen the fixing screw **1** of the retaining sleeve **2** on the spring arm. Push the sleeve far enough up for the thread to become visible. Turn the screw **1** into the thread, so that the sleeve cannot slip downwards.
- Insert the stud into the spring arm in such a way that the lamp is in the position illustrated (see drawing –top view). Secure the lamp with the segment **3**. Fasten the lamp with the screws **4**.
- Fix the retaining sleeve **2** with the screw **1** into the initial position.

Caution:

Mount the lamp under all circumstances in the shown position, since the bow could touch the spring arm while handling the lamp.

Removing the mounting safeguard

The spring arm is locked in the centre position. In order to permit free movement of the arm, pull out the locking pin 5 on the side (approx. 1cm).
The lamp body must under all circumstances be mounted beforehand.

Dismounting the lamp head from the Space spring arm

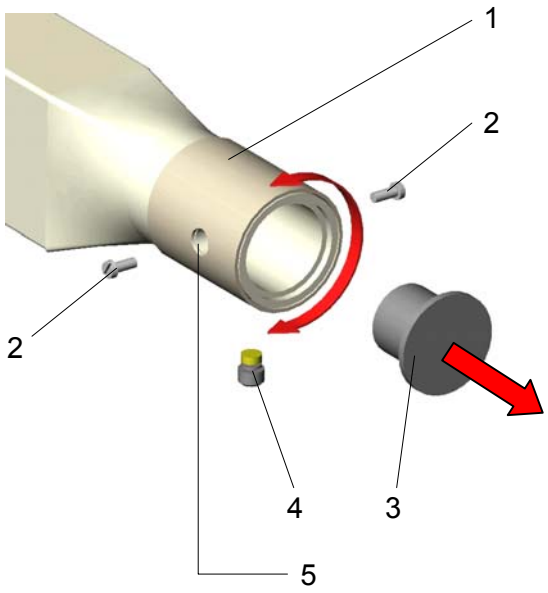
Caution:
Before dismounting the lamp, push in the locking pin on the side of the arm.

- Adjust the spring force as described in chapter 8.2.2.
- Adjust the vertical limit as described in chapter 8.3.2.

7.3 Mounting at the central spring arm

Central spring arm (since 2000)

Preparatory work



Attention!
Power off the on-site power supply and protect it from being switched on again.

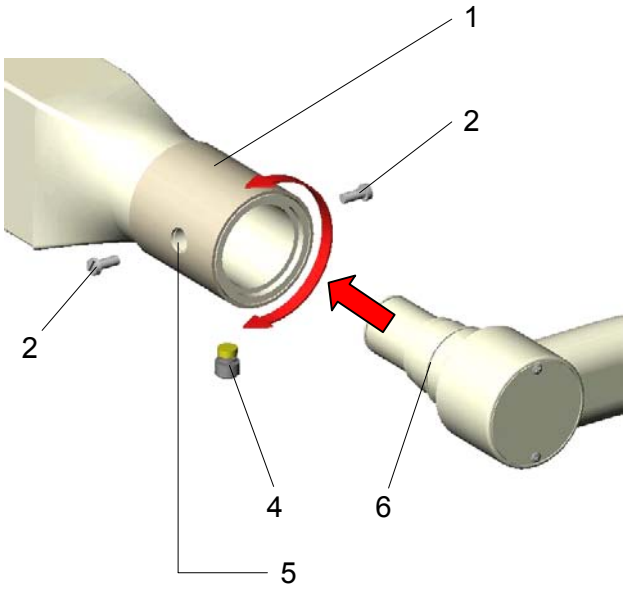
- Power off the pendant system / pull out the power plug and protect the pendant system from being switched on again.

Attention!
Danger of injury: The spring arm, when it is pressed down, can jump up suddenly and cause injury.
During the installation of the end device, do not allow anyone to be within the swiveling range of the spring arm.

- Turn mounting hole **5** in the sleeve **1** downwards.
- Remove the brake screw **4** at the bottom side of sleeve **1**.
- Turn sleeve **1** by 90 degrees and remove the end device securing screw **2**.
- Turn sleeve **1** by 180 degrees and remove the second end device securing screw **2**.
- Remove the protective cap **3**.

Mounting

Note: Maximum lamp / device weight: The lamps / devices must not exceed the weight of the mounted spring system. For details about the spring system please refer to the type plate of your ACROBAT 2000.

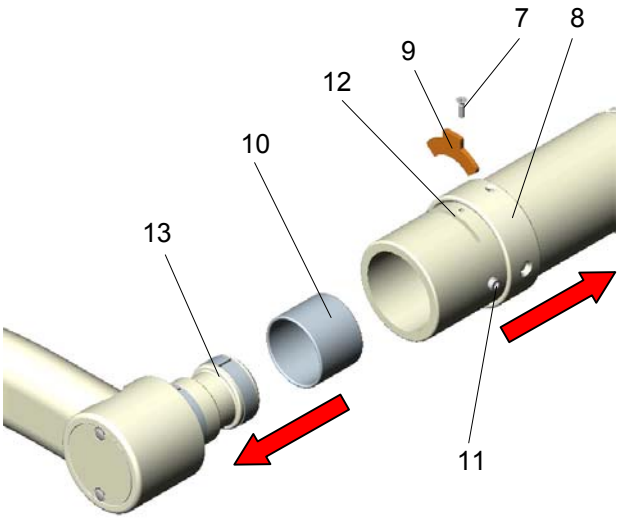


Spring version: 10,0 – 15,0 kg

- Insert the end device **6** into the mounting of the spring arm.

Attention!
Danger of injury: Hold the end device to avoid its falling down.

- Tighten the first end device securing screw **2**.
- Turn sleeve **1** by 180 degrees and tighten the second end device securing screw **2**.
- Turn sleeve **1** by 90 degrees and tighten the brake screw **4**.
- Adjust the brake force so the lamp / the end device always keeps its set position.
- Check the firm seating of the end device.
- Adjust the spring force as described in chapter 8.2.3.
- Adjust the verrtical limit as described in chapter 8.3.3.

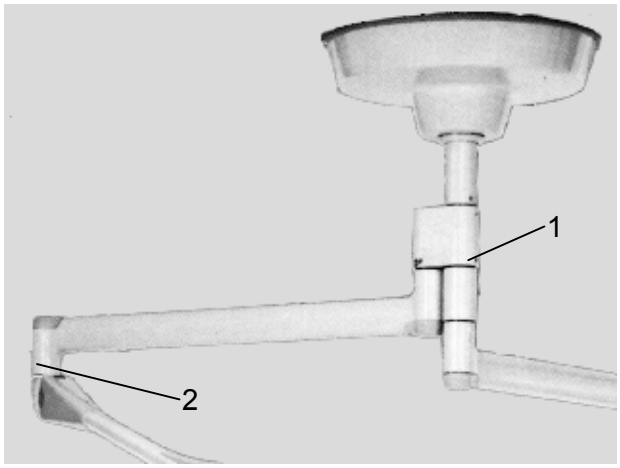


Central spring arm (until 2000)

- Loosen safety screw **7** using a crosshead screw driver and remove.
- Push safeguard bushing **8** backwards.
- Remove segment **9**.
- Slip helmet **10** over the journal of the lamp bow.
- Loosen the two lateral brake screws **11** on the spring arm using the allen key SW3 (included in the scope of supply).
- Push the lamp bow into the bore of the spring arm, such as the journal groove **13** is visible in slot **12**.
- Insert segment **9** and push safeguard bushing **8** forwards, such as the borehole in the safeguard bushing matches with the thread in the spring arm.
- Insert safety screw **7** and tighten.

8. Adjusting the mobility

8.1 Adjusting the mobility at the ceiling suspension

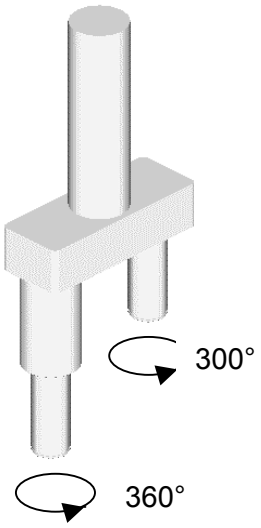


Please take note:

- Neither the bracket nor the spring arm may turn away by themselves.
- Bring the bracket and the spring arm in flat in-line position. When turning sidewards, the joint between bracket and spring arm must move first.
  If not, you have to adjust the brake between bracket and axis.

Double light weighted central axis

The position of the brakes (**1** and **2**) is shown in the figure.
The brake screws are slotted screws and hexagon socket screws on the central axis.



Double standard axis

There are no brakes at the axis.

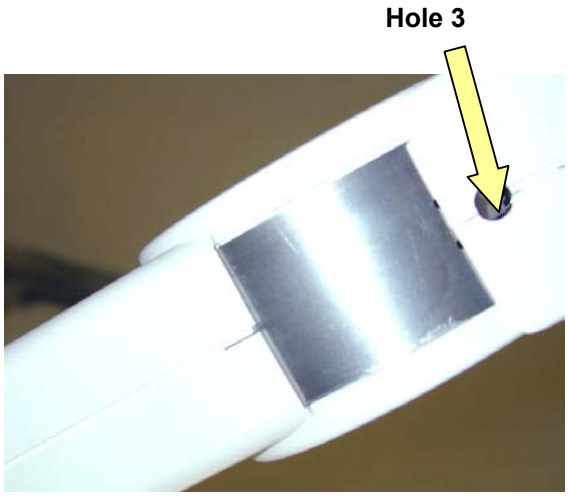
Slewing capacities of brackets:

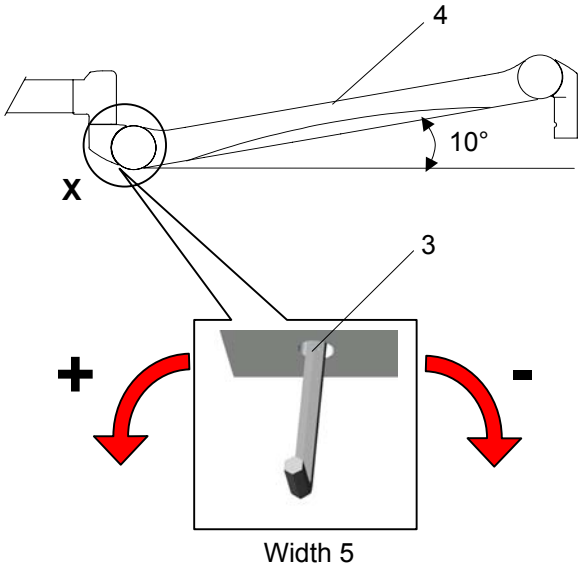
- bracket on the lower position – 360°
- bracket on the upper position – 300°

You only have to adjust the brakes **2** between brackets and spring arms.

8.2 Adjusting the spring force

The spring arm is correctly adjusted when the lamp remains in position at every set height and can be moved more easily upwards than downwards.
It is only possible to balance the weight, when the distance between ceiling and bearing journal exceeds 40cm. For low ceilings and consequently short suspension tubes, the drilled nut in the articulated arm described below, which is required for the balancing procedure, is not visible. The procedure for balancing the weights must in this case be carried out by Dr. Mach or someone authorised by Dr. Mach.
Should you discover, that the light no longer remains at its set height, proceed as follows:





8.2.1 Standard spring arm

Note:
Maximum additional load at spring arms: Spring arms are equipped with different springs to compensate the lamp / device weight.

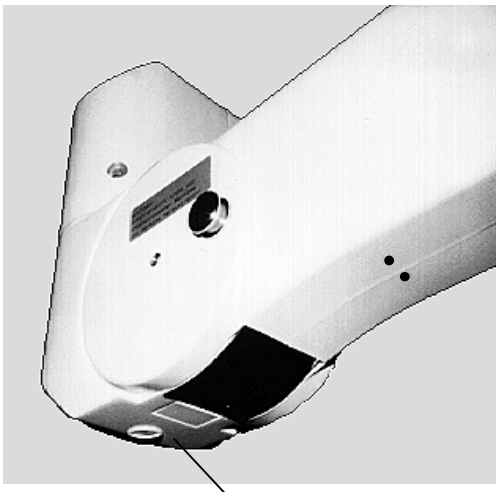
To adjust the spring force make sure that the spring arm with the lamp / device can come to rest in any desired position.

- A hole **3** is located at the position marked by detail **X**.
- Position the spring arm **4** with the lamp / device approximately 10° above horizontal.
- Insert Allan key (width 5, included in the scope of supply) into the hole **3**.

If the spring arm drops, the spring force is too low:
- Rotate the adjustment screw to the left (counter clockwise) in the **+** direction.

If the spring arm rises, the spring force is too high:
- Rotate the adjustment screw to the right (clockwise) in the **-** direction.

If the spring arm with the lamp / device cannot come to rest in any desired position after the spring force has been adjusted, the springs must be replaced by a service technician.



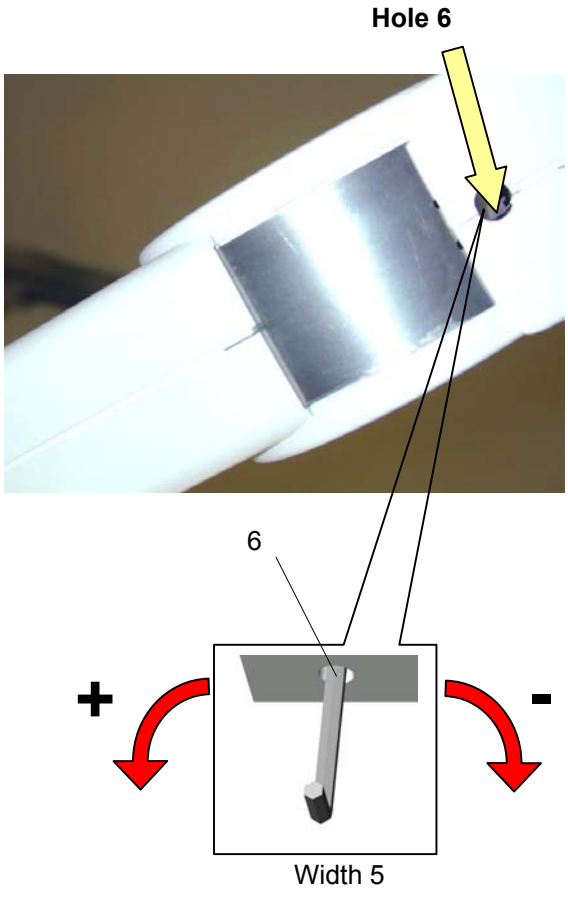
8.2.2 Space spring arm

If you find during use that the lamp does not stay at the height set, proceed as follows:
N.B.: Only adjust the setting after the locking pin has been released and the lamp is mounted. Any course of action other than that described can cause damage to the arm.

- Remove the protective cover **5** (on the under-side of the spring arm next to the horizontal arm).
- Insert the allen key (included in the scope of supply).
- Move the arm slightly out of the horizontal position in a upwards direction until the adjusting screw can be moved easily. It is easiest to adjust the screw, if you move the arm slightly up and down in the position found.

You should react as follows to the lamp body movements:
- Lamp moves **downwards** – turn allen key in clockwise direction.
- Lamp moves **upwards** – turn allen key in anti-clockwise direction.

Store the allen key and replace protective cover 5.



8.2.3 Central spring arm

Central spring arm (since 2000)

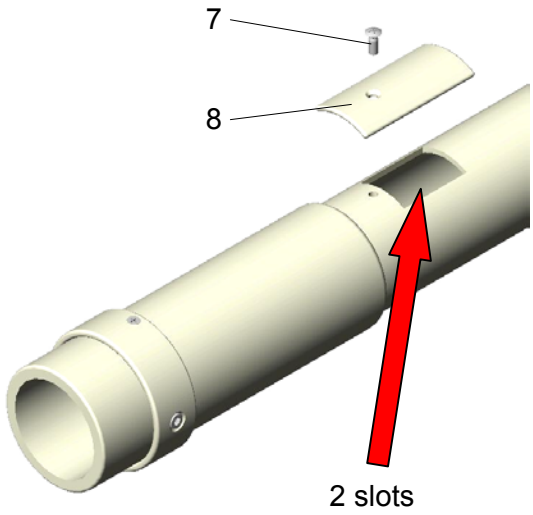
To adjust the spring force make sure that the spring arm with the lamp / device can come to rest in any desired position.

- Insert the Allan key width 5 in the hole **6**.

If the spring arm drops, the spring force is too low:
- Rotate the adjustment screw to the left (counter clockwise) in the **+** direction.

If the spring arm rises, the spring force is too high:
- Rotate the adjustment screw to the right (clockwise) in the **-** direction.

If the spring arm with the lamp / device cannot come to rest in any desired position after the spring force has been adjusted, the springs must be replaced by a service technician.



Central spring arm (until 2000)

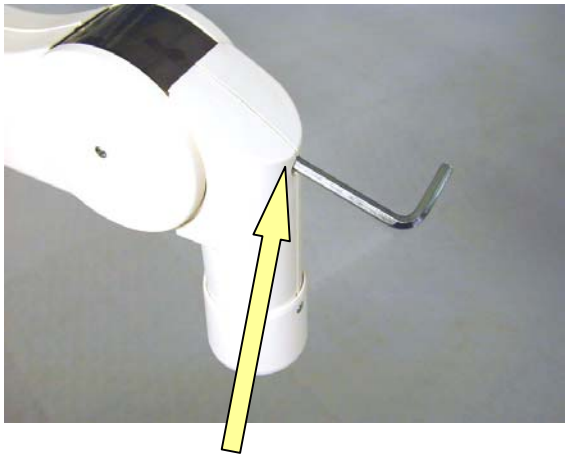
- Loosen fixing screw **7** and remove cover **8**. You can see two slots.
- Move the spring arm in a vertical direction, until the hole nut is visible in one of the slots (eventually in the upper position of the arm).
- Insert the key bolt (included in the scope of supply) into the hole nut and turn accordingly.
  Use only the enclosed key bolt, since a screw driver could break.

Proceed as follows depending on the movement of the lamp:

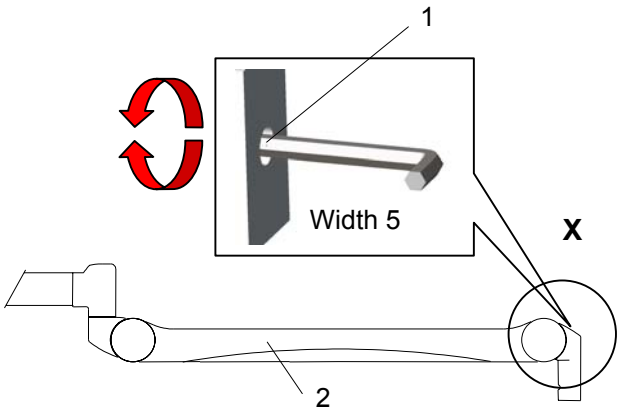
- Lamp moves **down** on its own – turn bolt in the direction of the „ **+** “ mark.
- Lamp moves **up** on its own – turn bolt in the direction of the „ **-** “ mark.

- Fix cover **8** with the screw **7**.
  Store the enclosed key bolt carefully.

8.3 Height adjustment



Hole 1



8.3.1 Standard spring arm

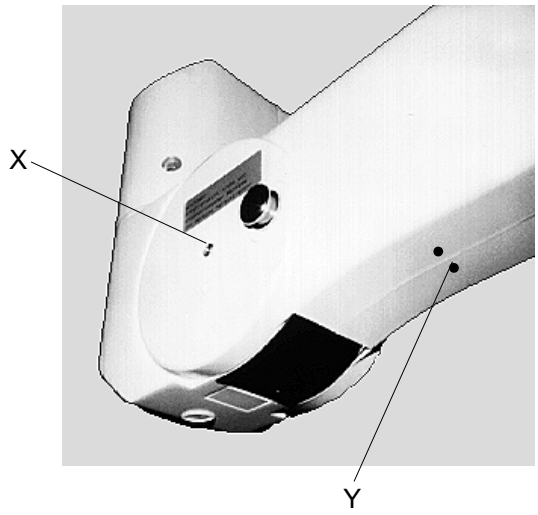
The vertical movement of the ACROBAT 2000 spring arm can be limited to 45 degrees above horizontal.

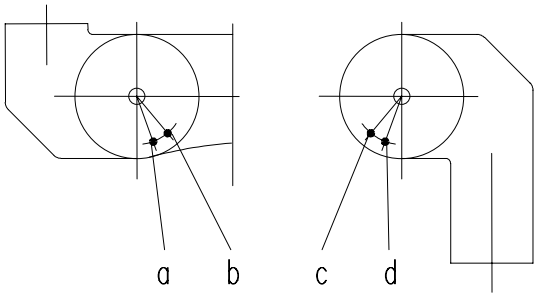
- A hole **1** is located at the position marked by detail **X**.
- Position the spring arm **2** with the end device to horizontal.
- Insert the Allan key (width 5) into the hole **1**.

To reduce the vertical movement:
- Rotate the adjusting screw to the right (clock-wise).

To increase the vertical movement:
- Rotate the adjusting screw to the left (counter clockwise).

Remark:
In case of stiffness while adjusting the vertical movement, slightly move the spring arm up and down.





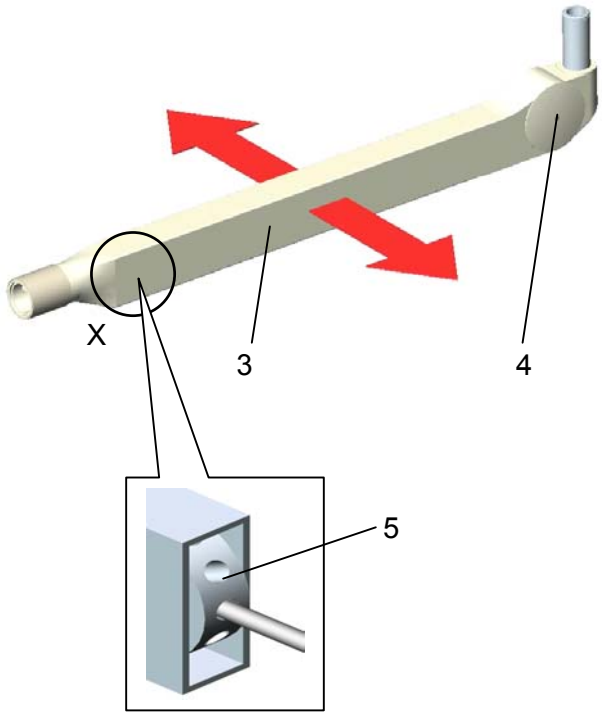
8.3.2 Space spring arm

The adjustment is carried out as follows:
Dismantle the plastic cover on both sides. Remove the four screws **X**, two screws **Y** on the top side and another two screws **Y** on the lower side of the spring arm and take the two halves apart.
Remove the two inside retaining rings of the stop pin.
Extract the stop pin and re-insert it in the required position. Damage can be caused, if the arm is used without the stop pin.
Affix the two retaining rings. Replace the plastic cover (four sealing flaps in the guide), engage these and secure the cover with the eight screws **X** and **Y**.

Position	Range of movement
a	40° downwards
b	20° downwards
c	40° upwards
d	20° upwards

8.3.3 Central spring arm

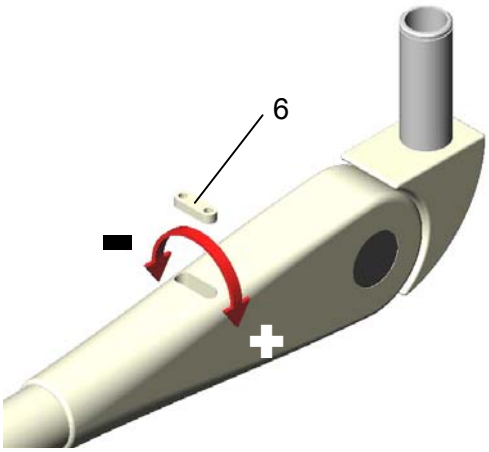
Central spring arm (since 2000)



At delivery the spring arm is set in the horizontal position.
The vertical movement of the spring arm can be enlarged up to 45 degrees upwards.

Attention!
Power off the on-site power supply and protect it from being switched on again.

- Power off the pendant system / pull out the power plug and protect the pendant system from being switched on again.
- Remove the two Philips screws **4** and take off the covers **3**.
- At the position marked **X** you can see the adjusting nut **5**.
- Adjust the nut **5** with the enclosed metal pin.
- Mount the two covers **3** and fix them with the two Philips screws **4**.
- Check the firm seating of the covers **3**.



Central spring arm (until 2000)

- Remove plastic cover **6** at the upper side of the spring arm. You can see one slot.
- Move the spring arm into a position, in which the hole nut is visible in the slot.
- Turn the hole nut with the key bolt (included in the scope of supply) in the direction of the „ **+** “ mark, until the required height position has been reached.
  Store the enclosed key bolt carefully and fix plastic cover 6.

Operating instructions

For handling the lamp, please observe the operating instructions supplied by the manufacturer.

9. Maintenance

After mounting the ceiling/wall suspension and the lamps, the brakes between brackets and spring arms and between brackets and axis (ceiling models) have to be adjusted depending on requirements.

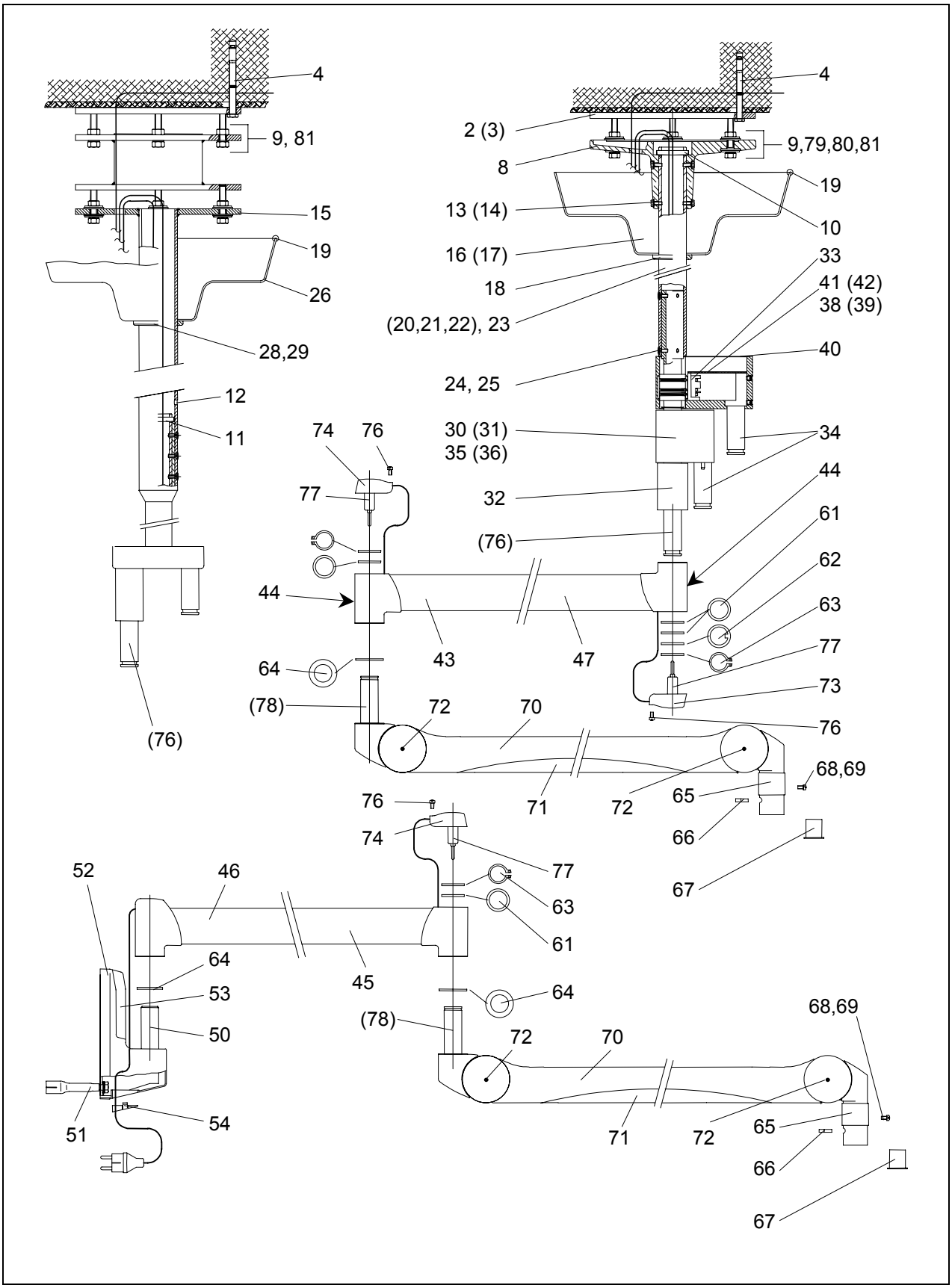
The suspension fixtures have been designed and built, such as regular maintenance intervals are not necessary.
In order to keep the system easy running throughout its life span, we recommend that the hinges should be greased once a year with an acid-free grease.
Caution: For the yearly maintenance the red safeguard angle G must be inserted and secured using cylinder screw H before the lamp is dismounted.

10. CE –mark

CE

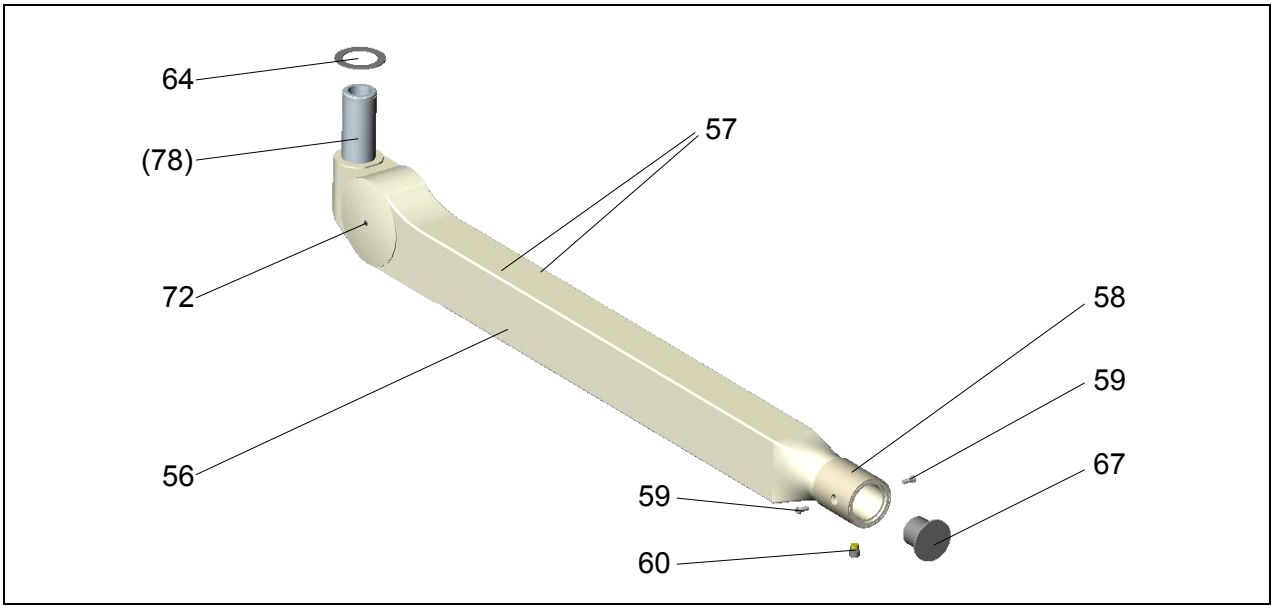
The products comply with the standard 93/42/EEC for medical products of the European Community’s Council.

11. Spare parts

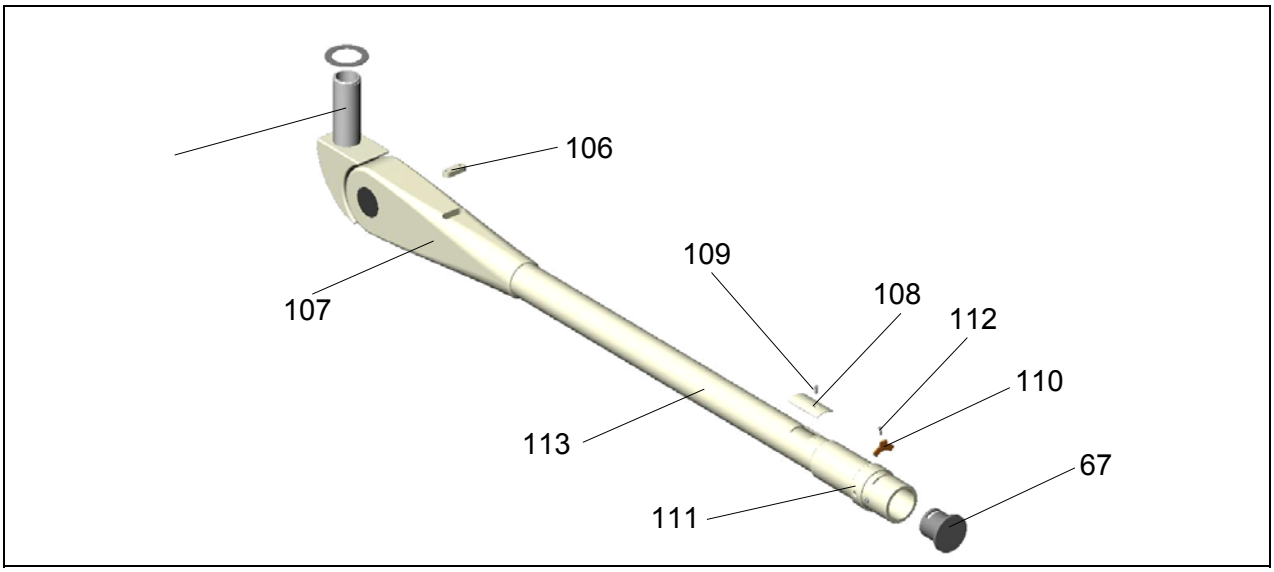


Spare parts for central spring arm

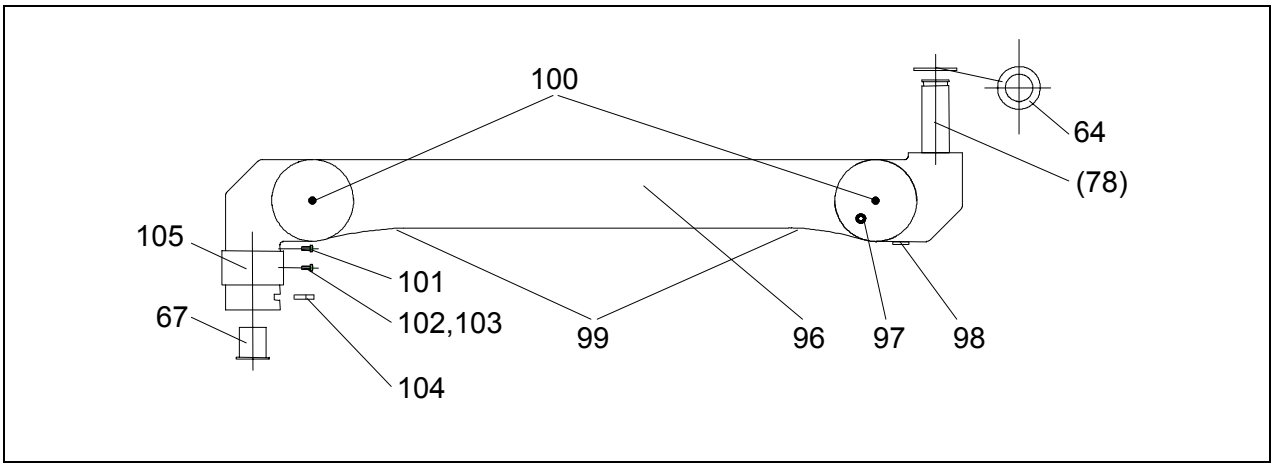
Central spring arm (since 2000)



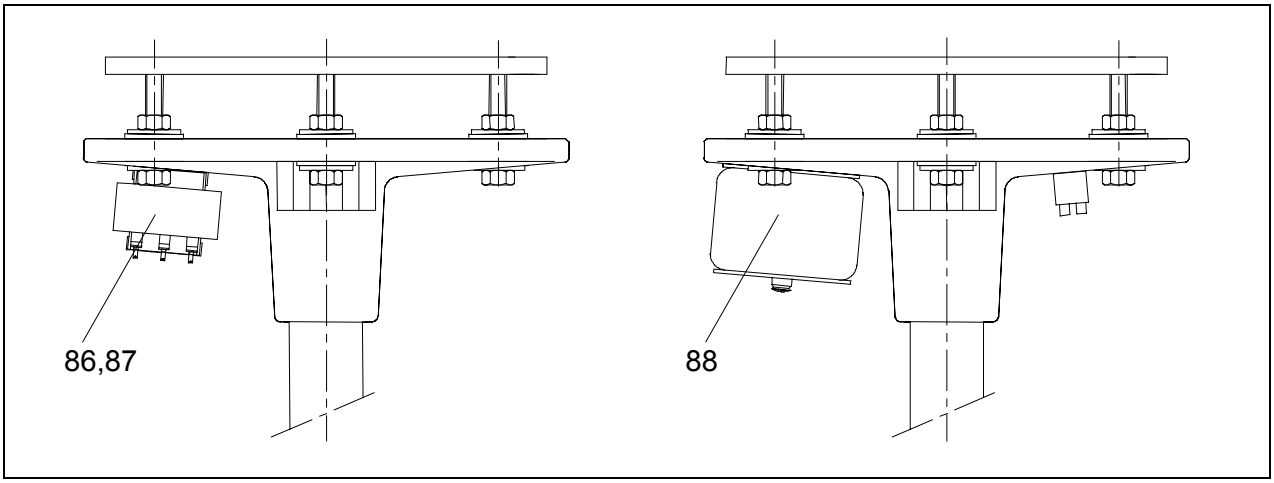
Central spring arm (until 2000)



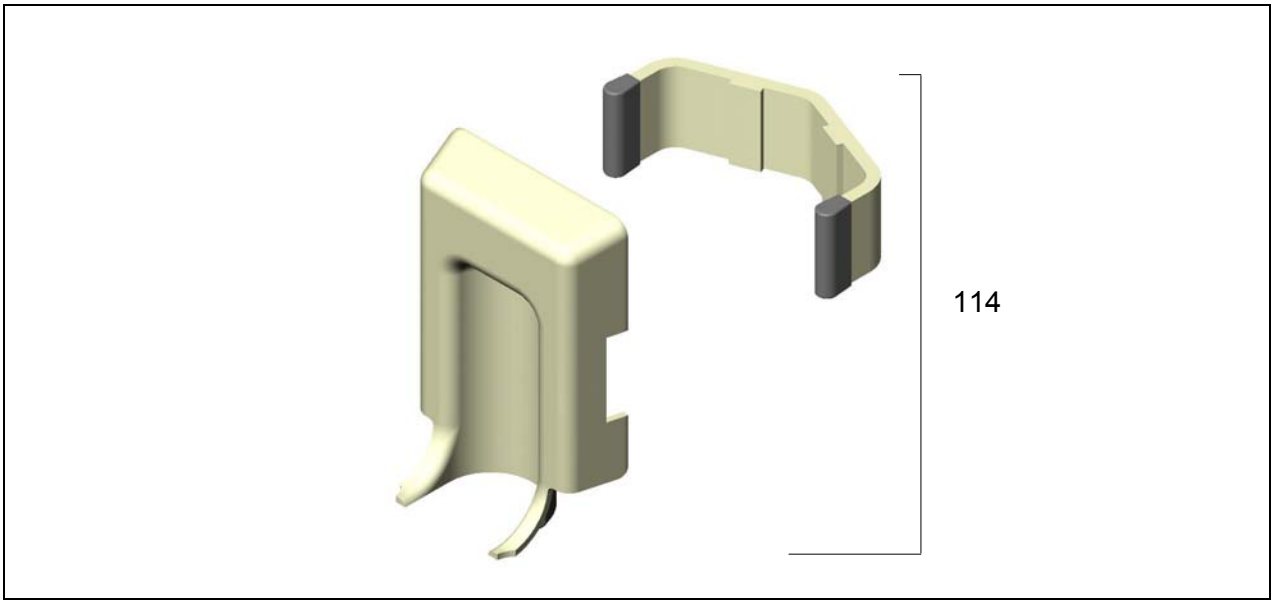
Spare parts for Space spring arm



Transformer mounted on the flange



Spare parts for wall bearing



12. Spare parts list

Item	Qty.	Name	EDVNO	Remark
01				
02	1	Ceiling anchorage ring TK 270	50480001	alternative
03	1	Ceiling anchorage ring TK 380/270	50480002	alternative
04	6	Safety dowels for ceiling anchorage ring		
05				
06				
07				
08	1	Ceiling flange TK 270	50482301	
09	12(24)	Nut M12 DIN 934-8 galZn	65332023	( ) with interm. flange
10	1	Safety bolt		Suspension tube ∅50
11	1	Safety bolt	50753203	Flange tube ∅70
12	2	Dummy plug		
13	6	Screw M6x16 DIN 933		
14	6	Retaining ring B6:A2 DIN 127		
15	1	Flange tube TK 270, diameter 70mm	50751001- 50751008	
16	1	Canopy 50/450	50222203	alternative
17	1	Divided canopy 50/450	50222208	alternative
18	1	Ring 50mm	50222202	
19	1	Cellular rubber seal 1430mm lang	50222209	
20	1	Suspension tube 50x4	50221001- 50221028	single
21	1	Double standard axis	50652001- 50652019	double
22	1	Light weighted double central axis	50850001	for 360°
23	1	Light weighted triple central axis	50850002	for 360°
24	6	Countersunk screw M6x16 DIN 7991 galZN	65162006	
25	6	Cover (white)		
26	1	Canopy 70/450	50753204	alternative
27	1	Divided canopy 70/450	50753206	
28	1	Ring 70mm	50754201	
29	1	Special ring 70/50 with washer	50754001	Not shown
30	1	Triple bracket	50850204	
31	1	Double bracket	50850203	Not shown
32	1	Intermediate bushing for double turn	50850215	
33	1	Sliding contact set	50852001	Triple version: 2 each
34	1	Coupling journal	50851201	Triple version: 2 each
35	1	Triple suspension for turning through 360° complete	50850002	
36	1	Double suspension for turning through 360° complete	50850001	Not shown
37				
38	1	Cover for triple bracket	50850208	Not shown
39	1	Cover for double bracket	50850207	
40	2	Countersunk screw M2,5x5 DIN 963	65082035	
41	1	Safety plate for triple bracket	50850206	Not shown
42	1	Safety plate for double bracket	50850205	
43	1,2,3	Ceiling bracket		750mm – standard 600mm – option 950mm – option
44	2	Adjusting screw for brake		
45	1	Wall bracket		750mm – standard 600mm – option 950mm – option
46	2	Cover for wall bracket		
47				
48				

Spare parts list

Item	Qty.	Name	EDVNO	Remark
49				
50	1	Wall bearing	74841001	complete
51	1	Attachment set for wall bearing	74841002	
52	1	Cover for wall bearing	74841003	
53	1	Cover for wall bearing	74841004	
54	1	Cap	74841005	
55				
56	1	Central spring arm Acrobat 2000		
57	2	Cover for central spring arm		
58	1	Sliding sleeve		
59	2	Safety screw for central spring arm		
60	1	Brake screw for central spring arm		
61	2	Levelling washer	74011012	
62	1	Gib washer	74011013	
63	1	Circlip	74011014	
64	2	Levelling washer	74011012	
65	1	Sliding sleeve for semi-circular spring	53070208	
66	1	Semi-circular spring	74011001	
67	1	Helmet		
68	1	Safety screw M4x10 DIN 7985	65152035	
69	1	Serrated lock washer A4,3 DIN 6798	65592008	
70	1	Standard spring arm Acrobat 2000		
71	2	Cover for spring arm		
72	4 (2)	Fixing screw for cover		
73				
74	1	Cover		
75				
76	1 (2)	Sliding contact complete with cabling	50223001 ...28	Ceiling tube – 1 piece Standard axis 2 arms– 2 pieces Light-weighted central axis 2 arms – 2 pieces
77	2	Sliding contact plug	67330002	Wall arm one only
78	2	Sliding contact sleeve	67330001	Wall arm one only
79	12	Washer 13 DIN 9021 galZn	65272001	
80	12	Insulating washer	50281222	
81	6(12)	Retaining washer SK12 galZn		( ) with interm. flange
82				
83				
84				
85				
86	1	Transformer 40VA	67010205	Mach 120; Praxila ceiling / wall models
87	1	Transformer 120VA	67010202	Triaflex ceiling model
88	1	Toroid transformer 200VA 300VA	67010208	Trigenflex, Quintaflex, Mach M3/380/400/500 ceiling models
89	1	Electronic transformer 50VA (not shown)	67010401	Mach 120 wall model
90	1	Canopy 50/420; height 110mm	50222207	Not shown
91		Flat canopy 50/450; height 60mm		Not shown
92		Cylindric canopy 50/400; height 225mm for camera		Not shown
93		Divided covering plate 50/450; 2mm thick	50281225	Not shown
95		Cylindric canopy 50/400; height 170mm for camera		Not shown

Spare parts list

Item	Qty.	Name	EDVNO	Remark
96	1	Space spring arm	74804001 74804002	
97	1	Stop pin		
98	1	Covering cap		
99	2+8	Cover, 2-parted with screw M3x6 ULF	74012026	
100	4	Screw M4x8 DIN 966		
101	1	Screw M4x25 DIN 966	65112012	
102	3	Screw M4x10 DIN 912	65052017	
103	3	Serrated lock washer A4,3 DIN 6798	65592008	
104	1	Semi-circular spring	74011001	
105	1	Sliding sleeve for semi-circular spring	53070208	
106	1	Cover for height adjustment		until 2000
107	2	Cover	74012025	until 2000
108	1	Cover for spring force adjustment		until 2000
109	1	Screw for pos. 108		until 2000
110	1	Sem-circular spring	74011001	until 2000
111	1	Sliding sleeve for semi-circular spring	53070208	until 2000
112	1	Securing screw M4x10 DIN 7985	65152035	until 2000
113	1	Central spring arm	74803002	until 2000
114	1	Extension arm stop for wall lamps incl. upper plastic cover with cut-out	74829005	surcharge